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ORNITHOLOGY OF THE SECOND BYRD ANTARCTIC EXPEDITION

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THE second Byrd Antarctic Expedition embarked from Boston on October 11, 1933. After passing through the Panama Canal, we touched Easter Island, then crossed the Pacific to Wellington, New Zealand. A southeast course from there brought our vessel into ice-filled antarctic waters east of the Ross Sea. A large area of unknown ocean was explored by ship and airplane as far east as the 116th meridian, where we turned westward again. One month after the ship had first entered the pack-ice, it reached the southernmost shore of the Ross Sea. The Bay of Whales is that point on the circumference of the antarctic continent where the ocean encroaches farthest toward the pole. Here at 78° 34′ S. and 163° 56′ W., the base camp was established on the floating shelf ice of the Ross Barrier. The ice-party occupied the Bay of Whales base from January 17, 1934, until February 5, 1935, while the ships wintered in New Zealand. The itinerary of the return voyage included Dunedin, New Zealand, Easter Island, Albemarle Island of the Galapagos archipelago, and Panama. The expedition arrived in the United States on May 10, 1935, after an absence of nineteen months.

The present paper reports the birds observed at sea and on the antarctic continent by the writers during the second Byrd expedition, when Lindsey studied the vertebrates of the Bay of Whales region, and Siple worked for two months in Marie Byrd Land. Observations in the Bay of Whales made by Siple during the first Byrd expedition are also included in the discussions of seasonal occurrence. His collection of bird skins made in 1929–30 has been reported on by Dr. R. C. Murphy in 'Oceanic Birds of South America' under the biographies of the species in question. The 1933–35 collection made by Lindsey is summarized below. The writers are grateful to Professor A. A. Allen and Dr. R. C. Murphy for critical reading of the manuscript, and to Dr. Murphy for verifying and correcting their identifications of the oceanic-bird material collected, which has been placed in the American Museum of Natural History.

Fifty-four species of birds were identified in the course of the second expedition. Twenty-three of these were non-oceanic birds which came aboard ship from October 14 to 30 between New York and Panama. Nine species of sparrows and four species of warblers were among the passerine birds. The following list includes the non-passerine birds identified at sea, but not collected.

Galapagos Penguin, *Spheniscus mendiculus* Sundevall
Sooty Albatross, *Phoebetria fusca* (Hilsenberg)
Light-mantled Sooty Albatross, *Phoebetria palpebrata* (Forster)
Giant Fulmar, *Macronectes giganteus* (Gmelin)
Cape Pigeon, *Daption capensis* (Linnaeus)
? Bulwer's Petrel, *Bulweria bulwerii* (Jardine and Selby)
White-faced Storm Petrel, *Pelagodroma marina*, subsp.
Caribbean Man-o'-war Bird, *Fregata magnificens rothschildi* Mathews
Man-o'-war Bird, *Fregata minor*, subsp.
Flamingo, *Phoenicopterus ruber* Linnaeus
Purple Gallinule, *Porphyrula martinica* (Linnaeus)
Red-billed Gull, *Larus novaehollandiae scopulinus* J. R. Forster
Antarctic Tern, *Sterna vittata* Gmelin
White Tern, *Gygis alba*, subsp.

The ornithological collection of the second Byrd Antarctic Expedition consists of one hundred and seventeen skins, chiefly of the larger oceanic birds. Twenty species are included, representing ten families, as follows:

Emperor Penguin, *Aptenodytes forsteri* G. R. Gray
Adélie Penguin, *Pygoscelis adeliae* (Hombron and Jacquinot)
Black-browed Albatross, *Diomedea melanophris* Temminck
Wandering Albatross, *Diomedea exulans exulans* Linnaeus
Silver-gray Fulmar, *Priocella antarctica* (Stephens)
Snow Petrel, *Pagodroma nivea* (Forster)
Antarctic Petrel, *Thalassoica antarctica* (Gmelin)
Pediunker, *Adamastor cinereus* (Gmelin)
Galapagos Shearwater, *Puffinus l'herminieri subularis* Ridgway
Wilson's Storm Petrel, *Oceanites oceanicus oceanicus* (Kuhl)
Red-tailed Tropic-bird, *Phaëthon rubricauda*, subsp.
Blue-footed Booby, *Sula nebouxii* Milne-Edwards
Masked Booby, *Sula dactylatra granti* Rothschild
Spotted Cormorant, *Phalacrocorax punctatus punctatus* (Sparrman)
Galapagos Man-o'-war Bird, *Fregata magnificens magnificens* Mathews
South Polar Skua, *Catharacta skua maccormicki* (Saunders)
Brown Skua, *Catharacta skua lönnbergi* Mathews
Dusky Gull, *Larus fuliginosus* Gould
Kelp Gull or Southern Black-backed Gull, *Larus dominicanus* Lichtenstein
Panama Potoo, *Nyctibius griseus*

ALBATROSSES.—Throughout most of the year the Ross Sea is completely shut off from the open Pacific by a band of drifting ice as much as three hundred miles in width. This is the antarctic ice-pack, a purgatory for the navigator but a paradise for the observer of bird and mammal life. Unfortunately for the latter, no pack ice was encountered on our return voyage. However, this brought a measure of compensation in its effect on the southward occurrence of albatrosses, so that the known non-breeding ranges of three species were extended.

The most southerly wanderer of the Diomedeidae is the Light-mantled Sooty Albatross (*Phoebetria palpebrata*). The southernmost prior record of this bird is that of Dr. Edward A. Wilson, who died with Scott's sledging party on the return from the pole. In 1904, Wilson had observed this bird at 74° S. At the beginning of our return voyage a Light-mantled Sooty Albatross was patrolling our wake at 77° 50′ S. Three days later, five Black-browed Albatrosses (*Diomedea melanophris*) joined us at a southward advance of 3.5 degrees beyond its former record. The stately Wandering Albatross (*Diomedea exulans exulans*) appeared at 68° 40′ S.; its

Three husky penguins brought back by the Byrd Antarctic Expedition

previous limit had been set at 67° S. by the naturalists aboard the 'Scotia' (Clarke, 1915, p. 267). These are advances of 230, 210 and 100 geographical miles, respectively, for the three species. If the albatrosses had followed a vessel southward into these high latitudes the position might not truly represent natural occurrence, but the birds were picked up on the northward voyage, with ours the only two ships in the entire Ross Sea.

On the southward trip the first albatrosses were met at 34° 3′ S. These were the Wandering and the Black-browed Albatross. In the 'roaring forties' two male Wandering Albatrosses were collected, the larger weighing 19 pounds and measuring 10 feet 9 inches in extent.

Snow Petrel and Antarctic Petrel.—We are here concerned primarily with the nine species of antarctic and sub-antarctic birds which were found in summer at the southern limit of the Ross Sea, along the Ice Barrier cliff. The Bay of Whales region marks the southernmost limit of eight of these species, a fact which lends increased interest to these records.

When an experienced ice-pilot in antarctic waters sights the first Snow Petrel he concludes that ice is not far away. The first part of its generic name, *Pagodroma*, means ice, its specific name, *nivea*, means snowy, and the bird itself is seldom found far from either ice or snow. This is the most abundant bird in the pack ice. It lives largely on the shrimp-like reddish crustacean, *Euphausia superba*, which is also the principal food of the Adélie Penguin, the Crab-eater Seal, and other denizens of the antarctic pack. The Snow Petrel's plumage is white with ivory tones; its beak, eyes, tarsi, and feet are black. This would be an altogether attractive bird were it not for its accuracy and eight-foot range in ejecting the oily, orange-colored contents of its stomach at the intruder.

After four months below the horizon, the sun reappears at the Bay of Whales on August 22. The earliest spring migrants are the Snow and the Antarctic Petrels. In 1929, a single Antarctic Petrel was seen October 2, but no Snow Petrels appeared until October 31. In 1934, a lone Snow Petrel and two Antarctic Petrels arrived October 6. In terms of the calendar this is analogous to the Bluebirds' delaying their arrival in the northeastern United States until the first week of April. The last Snow Petrel seen in the autumn was on March 13, after which no birds of any kind were seen.

Snow Petrels did not become common in the bay until December, or midsummer, when they congregated by thousands on the sea-ice and barrier cliff near open water. A few habitually coursed back and forth along the higher ridges of pressure ice, where it was possible to collect them by hiding among the ice blocks. A tractor party returning to the base saw a Snow Petrel flying over the barren shelf ice forty miles from the sea. Though this is the southernmost recorded individual, several of Scott's sledging parties saw these birds seventy miles inland (Wilson, 1907, p. 90). The breeding habits have been observed by half a dozen different expeditions.

No birds breed in the Bay of Whales region. The only known breeding ground within four hundred miles is a rookery of Snow Petrels discovered by a four-man sledging party which Siple led into the mountain ranges of Marie Byrd Land. On the return trip through King Edward VII Land an ascent of Mount Helen Washington was made on December 19, 1934. A great flock of birds enveloped the summit of the peak, about one thousand by estimate. Both Snow and Antarctic Petrels were represented, in approximately equal numbers, and the presence of a rookery was suspected. On the lower slopes many bleached petrel bones were found in the profuse matting of lichens covering the rocks. As the summit was approached the bones became more numerous, and fragments of egg-shells were found. The birds began swooping at the heads of the two climbers. Finally, at the summit of the peak the rookery was located, where Snow Petrels were sitting on their eggs deep in crevices among the rocks. They defended their nests with the customary marksmanship. The eggs collected were found to be in the early stages of incubation. No nests of the Antarctic Petrel were found, but from the numbers of the birds it seems likely that they nest on this peak with the Snow Petrels. A fact of unusual interest is the distance of this nesting site from the nearest water. These birds nest fifty-one statute miles from their nearest possible source of food. This disadvantage seems to be counterbalanced by the nature of the peak, where many sheltered nesting sites are available among the loosely aggregated rocks. Winds of hurricane force sweep over the peak and prevent large accumulations of snow, while the dark rock contributes by absorbing the sun's heat and melting the snow. Finding this rookery extends the breeding range of the Snow Petrel 6° 36′ or 452 statute miles to the south.

Planning an Escape From the Pit—An Adélie Penguin Leading the Meeting

In the ice pack in January flocks of hundreds of Antarctic Petrels were seen wheeling in unison above the great tabular bergs. About seventeen inches in length, or three inches longer than the Snow Petrel, this bird is no less handsome. Its chocolate-brown head, back, and wings furnish a pleasing contrast with the whiteness of the wing coverts and other parts. Our northernmost observation of it was at the same position as that of the Snow Petrel, 63° 30′ S. Both species are circumpolar in distribution from the northern limits of the pack to the coasts of Antarctica.

In the Bay of Whales the Antarctic Petrel was much more common in 1929 than in 1934. Large flocks were seen frequently in the summer of 1929–30, but disappeared after the middle of January, and from then on even single individuals were very rarely seen. In 1934, no flocks of more than four were to be found in the bay, and the bird was uncommon throughout our stay there.

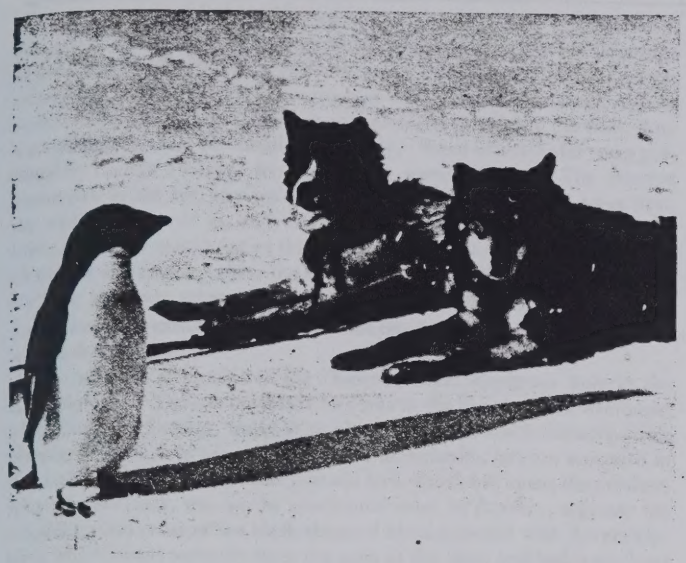
Silver-gray Petrel (*Priocella antarctica*).—This is the least common of the birds known to visit the Bay of Whales. In 1930, it occurred rather frequently among the large flocks of Antarctic Petrels early in January, but has not been recorded in the bay since that time. Our only specimen collected was secured on the antarctic circle and the 150th meridian, at the northern edge of the pack.

Cape Pigeon (*Daption capensis*).—This petrel has never been reported in the Bay of Whales. Its southernmost record is at Discovery Inlet, 78° 30′ S., where it was observed December 26, 1928, in the course of the first Byrd Antarctic Expedition. Apparently it had not been following the ship, for it paid little attention to it, and soon disappeared from sight.

Wilson's Storm Petrel (*Oceanites oceanicus oceanicus*).—Breeding only on antarctic and sub-antarctic islands and on shores of the antarctic continent, this species migrates as far north as Labrador during the southern winter. As for all birds which reach the Bay of Whales, except the South Polar Skua, this station marks its southernmost limit. Wilson's Storm Petrel is frequent here in January and February, and may be seen ten miles back from the sea, careening over the flat bay-ice in a very swallow-like manner. We never saw them alight on the ice. Scott's expedition observed these birds flying over the shelf ice some sixty miles from open water (Wilson, 1907, p. 79).

Giant Fulmar (*Macronectes giganteus*).—In summer during the second Byrd Expedition, after the sea ice at the mouth of the bay began to break up and float northward to join the pack, the Giant Fulmar or Giant Petrel was frequently seen soaring over the open water. This was not the case in 1928–30, however, for although several had appeared at Discovery Inlet, not one had been reported at the Bay of Whales until the autumn of 1933. The two stations are about eighty miles apart.

This species has two color phases, a brown and a white, with intermediate conditions. Wilson (1907, p. 96) pointed out that in proceeding southward the proportion of white specimens greatly increases. From 33° S. to 66° 7′ S., he saw only one white bird in five hundred, while south of 66° 7′ eighteen white and sixty dark birds were counted. Of about ten Giant Fulmars seen in the Bay of Whales in 1934–35, all were brown birds. None of these was



An Adélie Penguin Looking Over a Dog Team

seen at rest on the ice or flying over it, but always flying a few feet above the waves. In cruising along the barrier cliff between the Bay of Whales and Discovery Inlet, we saw a flock of about fifty which had settled on an ice floe. Only two of these represented the white plumage phase. Although these two stations are at the very southernmost limit of the range, within the scope of our observations the white birds constituted only 3.3 per cent of the sixty individuals, as compared with Wilson's 23 per cent.

South Polar Skua (*Catharacta skua maccormicki*).—The drama of antarctic bird life is not without its villain. Theft and pillage, murder, cannibalism and infanticide, these crimes are all in the repertory of the South Polar Skua. The Adélie Penguin rookeries suffer heavily from its depredations. The Emperor Penguins are immune to this plague only because they nest in the middle of winter, sharing with no other bird species the rigor of the polar night. At the afore-mentioned Snow Petrel rookery there were skuas about. Doubtless the petrels' habit of laying their eggs in narrow crannies serves to protect the eggs and young from skuas, as well as from the force of frequent severe blizzards. It was not possible for the sledging party to remain in the region until the eggs hatched, but the bones scattered around the rookery probably bear witness to the work of skuas, at least in part.

At the summit of an unnamed peak near Mt. Saunders, the Marie Byrd Land party made a find which is unusual indeed in these latitudes. A small unfrozen fresh-water lake in the black sedimentary rock supported considerable plant and animal life. The muck bottom was pinkish in color due to innumerable red rotifers. There was a profuse growth of filamentous green algae in the pool, and the water had a stagnant odor. The moss, *Grimmia antarctica*, grew along the bank. The tarn served as the rendezvous of skuas, and a deposit of guano around it attested to long use of this haunt. A half-dozen skuas loitered about all day, bathing in the lake and resting on the rocks. Snow Petrel feathers and bones disgorged in definite pellets were scattered around the lake. Since this is 180 geographical miles from the Snow Petrel rookery in King Edward VII Land, it seems likely that the skuas had brought the remains of the young petrels here from as yet undiscovered rookeries on those hundreds of nearer peaks along the coast, which have never been visited by man. The date of this observation was December 3. No egg-shells or other evidences of nesting were found, but the abundance of the skuas in the general neighborhood suggests the proximity of a rookery. This mountain is thirty geographical miles from the coast. A similar 'robbers' roost' of the skuas was found at the summit of Mt. Saunders, 76° 47′ S., and thirty-five miles from the nearest water.

The South Polar Skua wanders farther south over the continent than any other bird. Amundsen saw two of them on the Ross Shelf Ice at 84° 26′ S., and Dr. Gould, in 1929, photographed one at the Queen Maud Range, 85° S. On the second Byrd Expedition, the southern geological party reported one skua at 81° 41′ S. However, the record of greatest interest is an observation made by this party at 86° 05′ S., thirty miles up the Thorne Glacier, at an altitude over two thousand feet. The date was December 20, 1934, and the position 464 geographical miles from the nearest water and 235 miles from the pole. Here the men saw four skuas flying toward them from up-glacier, i. e., from the polar plateau, presumably. When the birds settled on the snow near the dog lines, the tethered dogs went into a frenzy at the sight of them. The birds rested for a time and finally took off, flying north, continuing the flight down the glacier. These facts suggest that the skuas may have been on a flight across the antarctic continent.

There is one still more southerly bird record, though the circumstances seem rather less suggestive. Captain Scott on his last journey wrote in his diary, January 2, 1912: "One skua gull visited us on the march this afternoon—it was evidently curious, kept alighting on the snow ahead, and fluttering a few yards as we approached. It seemed to have had little food—an extraordinary visitor considering our distance from the sea." This was on the plateau, at an altitude of 9,980 feet. The position was 87° 20′ S., or 160 geographical miles from the south pole, and 560 geographical or 640 statute miles from the sea.

Soon after the Byrd Expedition arrived at the Bay of Whales, numbers of Weddell Seals were being killed for dog food. At the time when our search for a seal embryo was first rewarded, the specimen was left lying on the sledge while preservative was being prepared. A sudden swift rush of wings, then skua and embryo were making for the horizon. On another occasion the thieving nature of the skua was accidentally sublimated into usefulness. We were attempting to collect fish by dynamiting from a small boat in open water. A current from beneath the ice, however, apparently carried most of the victims far out to sea before they floated to the surface. After shooting eighty sticks of dynamite at various depths, we had secured only two small specimens of *Pleurogramma antarctica*. A skua was then seen flying in from sea with a fish in its beak. While it alighted on the ice to devour its find, we rowed ashore and rushed toward it with wild shouts, so that it flew off, abandoning the scarcely damaged fish. Two other skuas were seen carrying fish ashore that day, whereas throughout both expeditions only one other case of a skua with a fish was observed. The only items in the stomachs of skuas we collected were pebbles, the blubber, flesh and hair of seals, flesh and bones from skua carcasses that we had skinned, and cuttlefish beaks.

The first springtime arrival of skuas in the Bay of Whales was on November 9, when three appeared. They were common during December, January, and February. The last autumn record for them was March 13, when the temperature had been dropping to −30° F. for a week. Eighteen specimens taken in the middle of December were equally divided between the sexes, and the gonads of both evidenced reproductive activity.

Adélie Penguin (*Pygoscelis adeliae*).—After twelve days of cruising eastward through pack ice and bergs, we saw the first Adélie and Emperor Penguins at 68° S. and 124° W. The Adélies were the more abundant of the two. Both adult and immature birds of each species were seen. The immature Adélies greatly outnumbered the adults, and two seen January 2 carried the remnants of their down plumage. This is remarkable, for Wilson (1907, p. 58) found that the nestling down is moulted *at the rookery* between January 9 and 16. The two white-throated young in question were on a large ice-pan 180 miles north of the nearest possible unknown coast line. They were not seen to enter the water. Perhaps they were carried away accidentally from the vicinity of the rookery with the break-up of sea ice along the shore, and were finishing the moult on floating ice as the Emperor Penguin chicks do in the spring during their ride north to the pack. Even so, January 2 would seem to be unusually early for the last of the down to be shed. This occurrence may indicate the presence of a rookery near the 115th meridian, and probably to the east of it since the ocean current is westward-flowing along these coasts.

The white-throated immature plumage is carried for thirteen months, and is replaced by the black-throated adult plumage in the latter part of February of the bird's second year. Only birds in the adult plumage migrate south to the rookeries in the spring. The black-throated birds which we find in the pack in early January are obviously not breeding. These may be third-year birds remaining in the pack for another year after acquiring the adult plumage. If so, as Wilson (1907, p. 58) has suggested, it follows that the penguins are three years old before they breed.

In the Bay of Whales the earliest spring record is a specimen taken November 14, 1934, nine days after the first Emperor had arrived. Both species are merely visitors in the bay, for their nearest known rookeries are

at Cape Crozier, 400 miles to the west. Not another Adélie was seen until January 5. After this date they appeared occasionally in the bay in groups of from two to four, but only one such group was seen at a time. In fact, throughout the summer's work in the Bay of Whales, only fourteen Adélies were seen here in all. Yet at Discovery Inlet, eighty miles to the west, they were numerous after the middle of January. Some of the latter were presumably from a rookery, for the gonads were enlarged. The relative abundance at the two stations also suggests that the birds had come from the rookeries west of us, and that most of them go ashore at Discovery Inlet, only a few continuing to the Bay of Whales. It also may indicate the absence of any rookery along the equivalent four hundred miles of coast to the east, the more strongly because the westward-flowing coastal current would favor movement of birds toward the bay from the east, while opposing it from the west.

With a single exception, all the Discovery Inlet specimens were in the adult plumage. The one immature bird was in the bleached and weathered white-throated plumage, ready to moult soon into the black-throated adult plumage. Such birds are not to be found in rookeries, but are met with in the pack ice. The fact that this year-old bird, which had spent the previous winter in the pack, was on the continental coast in January, suggests the possibility that some of the black-throated birds collected with it were also birds which would normally be in the pack at the time, and had come from there rather than from any rookery. These would then correspond to the black-throated non-breeding Adélies which we saw in the pack along the antarctic circle in January. Instead of remaining in the pack to moult with their fellows, they had wandered perhaps eight hundred miles to the south to moult in the security of a sheltered bay along the Ross Ice Barrier.

Of the twenty-seven specimens taken in January on the coast, ten were females and seventeen were males. The mean total length of twelve males was 29.0 inches, and of seven females, 26.9 inches. The weight of twelve males ranged from 7.5 to 10 pounds, averaging 8.5 pounds. Three females averaged 8.2 pounds. Wilson (1907, p. 43) states that a collection of small pebbles is invariably found in the stomach. This does not apply to birds in the moult, which are fasting since they dare not enter the water. Most stomachs examined contained from one to ten pebbles each, but six stomachs were completely empty.

In 1929, the white-throated juveniles were not uncommon in the flocks of adults. The largest group of Adélies we saw at any one time was a compact flock of 85 adults on the sea ice at Discovery Inlet.

Emperor Penguin (*Aptenodytes forsteri*).—These largest of living penguins were more frequent visitors to the Bay of Whales than the Adélies in 1934–35, but the reverse was true in 1929–30. Their remarkable habit of breeding during the extreme cold and darkness of the antarctic night leaves them free in summer to wander along the coast and through the ice pack. Many Emperors are to be seen in the pack during December and January, both juvenile and black-throated birds. Others of both groups seek coastal bay ice, such as the Bay of Whales affords, on which to moult.

Although conspicuous by virtue of their size, coloration, and loud, reedy, whining call note, Emperors are by no means abundant in the bay. Throughout the summer of 1934–35, though we were on the bay almost daily for three months, the total number of Emperors seen was only thirty-two. The first in the spring appeared November 5, after which none was seen for a month. On the first expedition they were even less commonly found.

An Emperor was found starting to moult as early as December 5. The birds avoid the water and take no food during the moult, which lasts nearly one month. Eighteen specimens taken in November and December, before the moult, ranged from 60 to 84 pounds, while eleven taken after the moult, in February, ranged from 39 to 55 pounds. The mean weight before the moult was 70.1 pounds, and after the moult, 49.8 pounds. Some taken in the latter part of December had already completed the moult and were feeding. Their stomachs contained fish and *Euphausia* remains, and usually pebbles, though not invariably. The pebbles had undoubtedly been secured elsewhere, for no land is exposed within one hundred miles and the sea is 1800 feet deep beneath the bay ice. Sixty-eight grams was the maximum weight of pebbles found in one stomach; the largest pebble weighed six grams. Sclater (1888, p. 325) reported pebble masses from two to ten pounds in weight. They rest remarkably far down, since the lowest part of the greatly elongated stomach reaches nearly to the base of the body cavity. The weight of pebbles at this point lowers the penguin's center of gravity and possibly helps it to some extent to maintain its upright posture on the ice. This may also serve as ballast when diving, as Murphy (1936, p. 364) has suggested.

Emperor Penguins on the March

Only two of the Bay of Whales Emperors were in juvenile plumage. These individuals were about seventeen months old and soon to assume the adult coat. Four such birds caught at Discovery Inlet moulted into the adult plumage while in captivity. All of the juvenile Emperors seen along the coast were over one year old.

The pupil of the eye is capable of great change in size in relation to light intensity. In the bright sunlight of the antarctic summer the pupil is less than a millimeter in diameter. The iris is dark rufous in color. The shapes which the pupil assumes at different apertures are similar to those of the King Penguin (*Aptenodytes patagonica*) as described by Murphy (1936, p. 343). At a moderately small aperture the Emperor's pupil is distinctly square, and in closing further the corners become more sharply defined. Finally, when less than three or four millimeters in diameter, the pupil shows very sharply attenuated corners, since the iris bows inward from the four sides. The characteristic call note is given by both sexes.

A dog-team driver on the trail east of the base saw an Emperor's tracks fifteen miles south of the coast in the first week of January. The penguin was heading south, on the high shelf ice. Such wanderings are typical of the moulting period. It is not probable that this bird was lost, for we found that captive penguins released on the barrier surface were able to head accurately in the direction of the nearest water, possibly by a reaction to the dark band of 'water-sky.'

These penguins displayed apparently intelligent behavior when a group of them skirted the edge of the high barrier cliff in an effort to find a way down into the water. One or two of the flock would drop down on their bellies and toboggan up to the edge. After peering over and finding a precipitous sixty-foot drop, this advance guard would turn directly about and slide back to the flock which had remained at a distance of twenty feet from the edge. Here the birds would again stand up on their feet and the whole group would waddle along parallel to the edge forty feet or so, when the whole performance would be repeated. This continued for miles, and was observed with different groups of Emperor Penguins. Those who have seen the barrier edge calve off into the sea under the slight weight of man or dogs might be prone to attribute to the penguins a realization of this danger. This anthropomorphic interpretation fits well with the popular idea of the birds' cleverness. The ornithologist, however, might reach either of two conclusions. Since antarctic seas are filled with great tabular icebergs, merely loose pieces of shelf ice derived from the Ross Barrier or similar formations, it would seem probable that penguins find sloping edges and make their way to the top, later following along the steep edge in search of the same or another route back down. An instinctive fear of high and steep places would have survival value and be implanted in the race through a long period of selection. Or, again, it might be concluded that some or all of these birds had been conditioned by personal experience with unstable overhanging snow cornices on a smaller scale, or had been blown by high winds off the edges of ice cakes, particularly when walking or standing erect. These possible explanations, however, seem unnecessarily elaborate. Consider the approach of a flock of Emperors toward a man or a dog team. They come up to within fifty or sixty feet, some walking, others tobogganing. Then they stand erect in a curious yet cautious group while one of them slides along on its belly to investigate, approaching to within ten feet or less of the strange object. After some trumpeting, bowing and scraping, it returns to the group. Another bird may then carry out the same procedure, or its curiosity satisfied, the flock may resume its leisurely walk. If man or dog advances menacingly, however, all the birds at once

drop to their bellies and skitter off at such a pace that a man running full tilt is hard put to overtake them. It seems, then, that the Emperor Penguin when out of water reacts in the same way toward any object of curiosity and potential danger, such as man, tractor, or the more usual problem of the steep edge of the ice. Their habit of approaching such situations on their bellies shows an apprehensive state of 'mind'. They are prepared for a quick retreat if the edge of the ice begins to crumble or in case of attack by natural enemies such as the Sea-leopard (*Hydrurga leptonyx*). Danger from the latter is confined largely to the water, however (Levick, 1914, p. 84).

After an unsuccessful attempt on the first Byrd Expedition to bring back living antarctic penguins for American zoos, another attempt was made on the second trip. The captives were kept at the base camp, where an area of about 5000 square feet of snow was enclosed by a wire netting. The first birds caught were kept here for two months before being transferred to the ship. Frozen fish had been purchased in New Zealand for feeding them. This was thawed in water and cut into strips of convenient size with the larger bones removed. The birds were fed once a day, and care was taken not to overfeed them, since some were moulting. Because the penguins were unable to recognize dead material as food, and were unwilling to accept the hospitality of their captors, forcible feeding was necessary. This required two men, one to catch the bird, overpower it and hold it down, another to pry open its beak and administer the food, piece by piece. At the end of two months one of the flock, an Emperor, had become reconciled to eating, and would open its beak for food.

On leaving the Antarctic we had twenty-one captive Adélies and nineteen Emperors housed amidships in an air-conditioned, refrigerated, cork-insulated room forty feet long, six feet wide, and seven high. Half its length was given over to a concrete tank of cooled sea water three feet deep. Air was pumped down from the masthead and cooled by passing through a large honeycomb coil of ammonia veins. On the cooler days the birds were taken out to a canopy-covered enclosure on deck for a chance to dry their feathers, since the necessity of continually washing down the room kept it too humid and the penguins were sometimes unable properly to dry themselves. After three weeks at sea, when the birds had been kept for two or three months in captivity, most of the Emperors no longer required forcible feeding. On the contrary, they had become very tame and friendly, since a new association had finally been formed and man now symbolized food. The task of feeding them was scarcely lightened on this account, for their greedy shoving and squabbling over each piece of fish created new difficulties. The fact that a very few of the adult birds ultimately learned to pick up food from water in a pan did not facilitate the feeding, because of their clumsiness and slowness in trying to feed themselves. The young Emperors were far behind the adults in their conditioning to hand feeding, and were more vicious in defending themselves against being fed. The Adélies showed still less adaptability and more pugnacity. Their stout hooked beaks proved much more formidable weapons than the long, curved bills of the Emperors. If the powerful Emperors had fought as strenuously in proportion to size, keeping them alive would have been quite impossible.

Unfortunately for the captives, the return voyage to America took more than three months due to the slow pace of the ships and an extended stay in New Zealand, where many of the Adélies died. By the time the expedition had crossed the tropics, nine of the Emperors had died from a heavy mycosis infection of the lungs, tracheae, and air sacs. Ten Emperors and one Adélie Penguin reached the United States alive and were delivered to the Chicago Zoological Society. The last of these died about two months later of the same disease. The Society transferred these birds to the Field Museum of Natural History, where they are now on display as a habitat group.

Literature Cited

Clarke, W. Eagle
1915. On the birds of the Weddell and adjacent seas, Antarctic Ocean. Rept. Sci. Results Voyage of S. Y. "Scotia," Scottish Nat. Antarctic Exp., vol. 4, pt. 14, pp. 255–270; Edinburgh. (Reprinted with slight verbal changes from Ibis, ser. 9, vol. 1, pp. 325–349, 1907.)

Levick, G. Murray
1914. Antarctic penguins: a study of their social habits. 8vo, New York, ix + 140 pp., illustr.

Murphy, Robert Cushman
1936. Oceanic birds of South America. 8vo, Amer. Mus. Nat. Hist., New York, 2 vols., illustr.

Sclater, P. L.
1888. Notes on the Emperor Penguin (*Aptenodytes forsteri*). Ibis, ser. 5, vol. 6, pp. 325–334, 4 figs.

Wilson, Edward A.
1907. Aves. National Antarctic Exped., Natural History, vol. 2, Vertebrata, pt. 2, pp. 1–21, pls. 1–13; London.

Clark University, Worcester, Mass.
Cornell University, Ithaca, N. Y.

From "The Auk," vol. 54, April, 1937.

PAUL SIPLE AND EDDY MOODY ABOARD THE *JACOB RUPPERT* FEEDING THEIR PET EMPERORS, RED, BILL, LENA, THE GIANT AND BOTTOMLESS

ANTARCTIC LURES ELLSWORTH AGAIN

By LINCOLN ELLSWORTH

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Once more the yearning to see for myself what lies within the areas that are now only blank white spaces on the maps has proved too strong for me. On Aug. 13 I shall leave New York on my fourth expedition to Antarctica, hoping to map from the air the largest unknown territory anywhere in the world, the Enderby Quadrant of the Antarctic continent.

Each time in the past that I have returned from an expedition—and I have been on three to the Arctic as well as the four to the South polar regions—I have vowed I would never go again, but I just cannot keep away from them. The polar regions leave a terrible restlessness in a man. Once having known them, you simply cannot settle down to a humdrum existence.

After having flown down one side of the Antarctic Continent two years ago, every time that I looked at the blank on the other side of the map I said to myself, "It's too bad not to fly down that, too." And now I have made up my mind to do it, even though it involves a financial sacrifice.

Virtually all of the 750,000 square miles of ice-capped land within the Enderby Quadrant have never been seen by man. The polar flights and other expeditions of the past have been almost entirely confined to the Weddell, Ross and Victoria Quadrants, but no one has ever penetrated more than a mile or two from the coast of Enderby Land. All the rest of it, extending 2,000 miles from the South Pole and 3,000 miles east and westward, is a mystery.

If I find conditions just right when I reach the coast of Enderby Land, some 2,500 miles south of Cape Town, I may attempt a flight in my Northrup Delta plane clear across the Antarctic Continent to Little America, more than 2,000 miles away, which was also the terminus of my flight from Dundee Island two years ago.

However, I do not plan to attempt this flight unless the weather is favorable. I do, however, plan to make a number of triangular flights from my base inland, mapping by camera as much of the unknown areas as possible, and I also hope to map the coast line more completely than has ever been done in the past, and possibly find suitable spots for future weather observatories.

How much I will be able to accomplish will depend in large measure on weather and ice conditions, of course. Terrific wind squalls are to be taken for granted in these regions, and the ice conditions are worse off the Enderby coast than anywhere else about Antarctica, but nevertheless I hope to be able to map the area for at least 500 miles inland.

It is my hope that from this fact-finding expedition we will be able to bring back much geological and other scientific information. Sir Douglas Mawson has found definite evidence of silver, copper and other mineral deposits along the coast, which may be indicative of rich wealth inland. This area is already claimed by Australia and consequently I will be unable to claim any new territory for the United States. On my expedition two years ago I claimed 300,000 square miles of territory for this country.

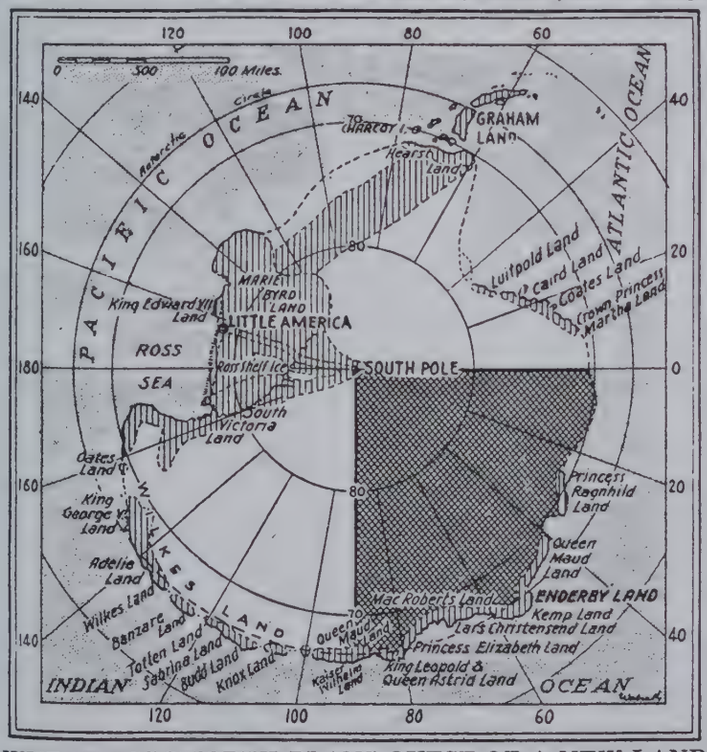
My expedition will consist of sixteen men, including ship's crew, airplane technicians and medical officer. I am not yet, however, in a position to announce the names of the personnel. The expedition will leave New York about Aug. 10 on the good ship Wyatt Earp, which has already carried expeditions of mine more than 120,000 miles.

Mrs. Ellsworth and I have reservations on the Europa, sailing three days later. From Southampton we plan to fly all the way to Arusha, near Nairobi, where we will remain until it is time for me to join the Wyatt Earp at Cape Town about Oct. 10. After loading additional supplies we will sail about Nov. 1 for the coast of Enderby Land, 2,500 miles to the south.

We ought to reach the coast within two or three weeks and begin our search for a base. When we have found a place where we can push our plane off an ice shelf and erect a few tents for the mechanics working on it, we shall do so. The men on the expedition will, of course, live on the Wyatt Earp throughout our stay, which will last until the end of January.

The mapping and exploration flights will be made by my pilot and myself. I will do the navigating and operate the mapping camera. If we decide to attempt the flight to Little America, we will carry three months' rations, which should be ample for us, as the Wyatt Earp should be able to get to us in about six weeks. For that matter, I know from my experience two years ago that there are quantities of seal meat in the tunnels connecting the buildings of Little America, frozen so hard that it remains good indefinitely.

On our return trip it may be necessary to head for Australia instead of Cape Town, because we would be bucking head winds which might exhaust the fuel of the Wyatt Earp before we could reach South Africa. But I am not thinking of the return now; it is the thrill of starting once again for the unknown that has possession of me



WHERE ELLSWORTH PLANS QUEST OF A NEW LAND

The dark section shows the Enderby Quadrant of the Antarctic continent which the explorer proposes to map from the air. The light section represents areas seen by previous expeditions.

Sound in the Antarctic Named for King George VI

LONDON, Jan. 13.—The sound separating Graham Land from Alexander I land in the Antarctic, whose discovery was the principal geographical achievement of the expedition led by John Rymill, will be known as King George VI Sound by the King's permission, it was announced tonight.

The sound is fifteen miles wide at the mouth and, as far as the expedition could ascertain, extends 250 miles in a southerly direction before turning westward. Whether it divides Alexander I land from the main Antartic continent still remains to be determined.

Great geological interest is attached to the discovery, for Graham Land is a volcanic rock while Alexander Land is of sedimentary rock in which the expedition found two fossil deposits.

Soviet Flier Plans South Pole Expedition; Vodopyanoff Suggests Three Years' Stay

MOSCOW, Jan. 1.—An indication that Soviet airmen and scientists will establish a scientific camp at the South Pole, as they did at the North Pole, was given today in a fictional article by Mikhail Vodopyanoff, Arctic flier, in Pravda, the Communist party newspaper.

The article, entitled "A New Year's Dream," describes such an expedition Vodopyanoff was the originator of the North Pole station plan that was executed last May. Fearing it would be considered fantastic, he first published it in fiction form. His similar tactics concerning the South Pole expedition have aroused belief here that such an expedition is being planned.

Further grounds for such a belief are found in another statement by Vodopyanoff in the Red Army organ in which he stressed that he planned to fly this year to places he had never seen and that he had new dreams for the future, all connected with the Arctic.

At the same time Mikhail Gromoff, leader of the Moscow-California flight last July, said in another newspaper: "We have flown over the North Pole. We will fly over the South Pole. We will fly over both poles, to the stratosphere, wherever our fatherland, party and Stalin send us."

When the Soviet fliers have established their camp at the South Pole as they did at the North Pole, wrote Vodopyanoff, "the world will rotate on a Bolshevist axis."

Vodopyanoff's "dream" begins with the loading at Leningrad of equipment and food for three years on the powerful new icebreaker, Joseph Stalin, now being built. He describes the loading of five two-motored planes, scientific apparatus and portable houses for the scientific observation posts and the voyage to Weddell Sea in the Antarctic.

Then he describes the establishment of a base 800 miles from the Pole and the flight of five planes to their goal, where they land and cheer for the fatherland and Stalin. Then they begin unloading and setting up the "permanent camp."

The planes make three trips between the Pole and the base with supplies and then spend a month at the Pole, making seventy surveying flights over the area between the Pole and the eighty-sixth parallel. Then four planes return to the base, leaving four scientists and one plane with a pilot and two mechanics in the polar village. The other planes go north with the Joseph Stalin.

Such an expedition would have enormous scientific value, writes Vodopyanoff, supplementing data gathered in the North Pole region.

VAST ARCTIC AREA FLOWN BY WILKINS

Fails to Locate Lost Russians on Hops Over the Arctic Wastes From Aklavik

By SIR HUBERT WILKINS

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AKLAVIK, N. W. T., Jan. 16.—In our first Arctic search by moonlight for Sigismund Levaneffsky and his five Russian companions, which was reported briefly yesterday, we covered 1,425 miles in temperatures ranging to 51 degrees below zero Fahrenheit.

For an hour after the start we flew over the river delta and smooth ice. Then, on a course direct from Aklavik to Lat. 80, Long. 145 degrees, we came to rough regular pack ice at Lat. 71.30. Thirty miles further north we were over broken ice and many leads, some of them apparently just open from the dark water which reflected the moonlight, and others newly frozen over.

From 8:05 P. M. until 9:30 P. M we ran into thin clouds at intervals of about five to ten minutes, with equal intervals of clear moonlight. From 9:30 P. M. on the cloud tops were above 5,000 feet and the ceiling low. At 10:05 P. M., after flying for half an hour in a snow-laden cloud without having seen the ice below, I decided to return, for, while it would have been possible to continue on above, it would not have served our purpose, which is to search the ice.

As we turned we ran into a hard granular snow which stung our faces as it blew through the open cockpit windows. For half an hour we flew in this snow cloud, which obstructed all visibility outside the cockpit. Our estimated position when we turned was Lat. 76 North, Long. 140 West. Returning, we shaped our course for Herschel Island, and our steady air speed and elapsed time before we were over Herschel Island confirmed our estimated turning point.

AKLAVIK, Northwest Territory, March 2.—Twelve hundred miles of flight from Aklavik over the Alaskan mountains in perfect sunshine and visibility failed today to disclose any trace of Sigismund Levanevsky and his five Soviet companions who were lost last August on a flight from Moscow to Fairbanks, Alaska.

Today we flew west to 154 degrees west longitude along the summit of the ranges, then back east and a little north of the westward course to 144 degrees west longitude, then back west to 150 degrees west longitude, then along the top of the northern edge of the ranges to a position opposite Herschel Island and thence to Aklavik.

AKLAVIK, N. W. T., March 5.—We have made just over three thousand miles in flight from Aklavik during our search of the Alaskan mountains for Sigismund Levanevsky. The mountains from Long. 141 degrees to 154 degrees W. have been covered without revealing a sign of the missing plane.

On Wednesday we flew four times along the full length of the ranges on easterly and westerly courses, and Thursday, after reaching Long. 153 degrees W., we hawked back and forth north and south across the mountains on courses less than ten miles apart until we reached the Alaskan boundary. We then made one more long west and east flight along the south slopes of the foothills before turning into Old Crow, where we had arranged to pick up gas before returning to Aklavik.

I believe that the search made by Russian and Alaskan aviators last Fall and that we have recently completed in Alaska has covered that area with practical completeness and that we must now conclude that Pilot Levanevsky, in spite of the report by an Eskimo who claims to have heard his plane, did not reach the Alaskan coast. Had he crashed in the mountains I think we would have seen the wreck. Had he landed on the Arctic tundra on the Yukon flats it would probably not have been a completely fatal wreck. Some of the crew would surely have been able to walk to some means of communication.

AKLAVIK, N. W. T., March 10.—A further 2,080 miles of flying over the Arctic from Aklavik to longitude 81 degrees 40 minutes north to 110 degrees west, where we ran into clouds, and from there northeastward to longitude 82 degrees north and 100 degrees west and return, has made for us, in spite of the milage covered, another disappointing day. With the exception of about 300 miles of the flight, visibility was good, but we saw no trace of Sigissmund Levanevsky [missing Russian flier], and our old enemy—clouds and haze—prevented us from putting in a further six hours in the air.

AKLAVIK, N. W. T., March 15.—Yesterday we completed the longest flight we have yet made in our search for Sigismund Levanevsky and his Soviet companion fliers, who were lost last August during a flight from Moscow to Fairbanks, Alaska.

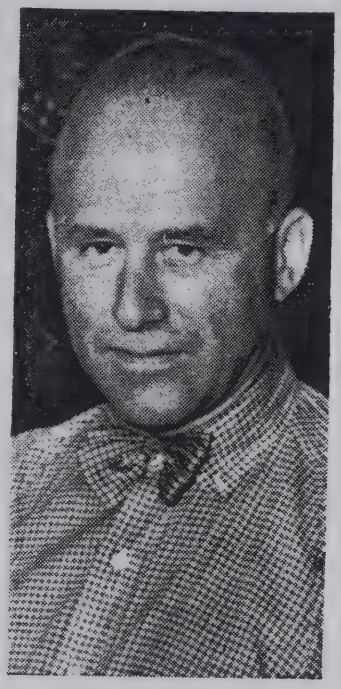
Starting from Aklavik at 7:30 A. M., Pacific standard time, we flew about north by east 1,325 miles to reach Lat. 87 degrees N., Long. 90 degrees W., a point within 200 miles of the Pole. With the exception of a few miles near Lat. 80 on the outward course, the visibility was the best we had yet. Even at Lat. 80 degrees N. we could see the ice, although conditions were somewhat hazy.

The last two hours, however, were also the most hazardous of our experience. Clouds blanketed Aklavik and all but the highest mountain peaks in the neighborhood.

Both our radio aids to navigation, the radio direction finder apparatus in the plane and our radio compass, were ineffective. However, our short-wave radio was functioning and our radio operator was able to keep us informed of the conditions on the ground. We were in the air 19½ hours.

We observed that some geographers still believe in the existence of the land to which Admiral Peary gave the name of Crocker Land. We wondered if we were to verify its existence. Although visibility was good, we could not see any land.

Times Studio
Sir Hubert Wilkins, commander



Times Wide World
Herbert Hollick-Kenyon, pilot

Alaskan Search Ended For 6 Russian Flyers

FAIRBANKS, Alaska, March 18 (CP).—Michael Beliakov, representative of the Russian government, announced today that search for the six trans-polar flyers missing since August 13 had been abandoned in Alaska. The flyers were headed by Sigismund Levanewsky.

Sir Hubert Wilkins, operating with a Russian-chartered search plane abandoned his base at Aklavik N. W. T., today.

WILKINS RETURNS FROM ARCTIC QUEST

Back After a Wide Search for Lost Russian Fliers

Sir Hubert Wilkins and his pilot, Herbert Hollick-Kenyon, who left New York last November to search the Arctic region for Sigismund Levanevsky and five Russian companions lost while on a flight to the United States, landed soon after 6:30 o'clock March 25 at Floyd Bennett Field in Brooklyn.

The explorer said he has not given up hope that the Russians are alive, but that, despite his desire to make two more flights over the Arctic ice in search of them, he was asked by the Soviet Government on March 15 to abandon the quest.

Sir Hubert said he believed Russian aviation officials think that if the missing fliers are alive, they have drifted on ice floes nearer the Russian area of the North Pole and that efforts will be made there to locate them. Apparently for that reason he was asked to give up the search, he said.

The explorer announced that he will continue his efforts to take a submarine to the Arctic. His recent flights over that territory and the information obtained by the Russian scientists who spent months living on an ice floe have convinced him, he said, that submarines can be used successfully in the Far North. He said he had a motor for his proposed undersea craft but would have to raise funds to build the hull.

Search in Arctic For Soviet Fliers Aids Forecasting

SEATTLE, Wash.—Co-operation among the Soviet Government, Canada, and the United States in searching for the Russian fliers lost on a trans-polar dash has greatly increased the efficiency in forecasting weather.

Dr. Vilhjalmur Stefansson, explorer and geographer who appeared at the University of Washington as a special lecturer, was authority for the statement that weather forecasting had advanced in efficiency more rapidly in the few months since the fliers were lost than at any time in history.

Dr. Stefansson quoted Willis R. Gregg, Chief of the United States Weather Bureau, as saying there had been much improvement in forecasting since reports began to come from Soviet stations in the Arctic. While this accelerated interchange of weather data among the Soviets, Canada, and the United States was brought about entirely by the disappearance of the fliers, Mr. Stefansson said, it probably would be continued permanently.

Commercial air routes between the United States and the Orient via the Pacific Northwest, Alaska, and Siberia will begin operation, he feels, as soon as there is peace in the Far East.

ARCTIC WINDS WHIP M'GREGOR CAMP

Storms Interfere With Auroral Observations at Reindeer Point in Greenland

By CLIFFORD J. M'GREGOR

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REINDEER POINT, Greenland, Dec. 11 (By Wireless).—Stormy weather continues at the base of the MacGregor Arctic expedition here. The records just completed for November show that snow fell on twenty-three days out of thirty, which, coupled with a considerable number of days with high winds, made it very disagreeable to carry on outside work.

The temperature remains considerably above normal, according to all available records made in this region since the Dr. Hayes Expedition of 1850 and the General Greely Expedition of 1881-83, when they recorded a mean temperature for November of 23.6 degrees below zero, while our mean temperature for the past month was 4.5 degrees above zero. This gives us a little over 28 degrees warmer weather than the former expeditions.

This might lead one to think that it is getting warmer in the polar regions and colder in the lower latitudes. I doubt whether this is entirely correct. I would rather think that this is just an exception, or rather just an unusual year.

There is one fact that stands out quite clear and that is there appears to be considerable cold air moving down from the polar regions near Alaska. When this cold air moves into the lower latitudes it must displace some warm air. This warm air has to go some place, so it is being pushed north into this locality, giving us our high temperatures.

One of the most important factors in weather appears to be the sun, which most meteorologists have neglected. We are now in the sun-spot maximum, which may account for some of the erratic changes in our present-day weather. The warmest day was on Nov. 16, when it was 17 degrees above zero. The coldest day for the month was on the 26th, when it was 11 below zero. On only two days did the maximum temperature go below zero. The greatest change occurred on Nov. 28, when the temperature dropped from 10 above to 7 below zero.

The barometric pressure was normal for the month. The mean was 29.92 inches. The highest pressure occurred on Nov. 11, when it was 30.55 inches, while the lowest occurred on the 23d, of 29.50 inches.

The windiest day was on Nov. 1, when 564 miles of wind blew past the station, giving an average of twenty-three miles an hour. The least windy day occurred on the 11th, with only 131 miles, or an average of a little over five miles an hour. The total miles of wind that blew past the station was 7,779 miles, with an average of ten miles per hour. The average wind velocity for the Greely expedition for the same month was 1.4 miles per hour.

Isaac Schlossbach

M'GREGOR HAILS A POLAR MIDNIGHT

Weather Observations Made Daily for Record if Airway Should Be Established

By CLIFFORD J. MacGREGOR

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REINDEER POINT, Greenland, Dec. 18 (By Wireless).

Here at our camp we are now nearing our so-called polar midnight, which occurs next Wednesday at 1:22 A. M. At this time the sun is really the closest to us, but because of the inclination of the earth, causes our long night. The sun left us last Oct. 24 officially, but because of the cloudy weather, we have not seen the sun since Oct. 9, when it was low on the southern horizon. We have had seventy-one days of night and will have sixty days more of night before the sun returns. This may be increased due to cloudy weather when the sun returns Feb. 17.

There is plenty of work to be done even through the long dark night. We have been constructing and fitting up sledges and have five prepared for the Spring work that will start as soon as the sun returns. During the past week we have had considerable moonlight which is bright enough to furnish light to travel. Therefore a good deal of work has been carried on during this period.

Several trips have been made north to Littleton Islands to condition the dogs, as well as give some of the fellows an opportunity to drive dogs. Leaving the base camp, one travels nearly due west about four miles before heading north.

The fiord is smooth going, but as you near the sound, you find much open water, with a ten or eleven-foot tide running, making it very dangerous to travel unless there is good light. Most of the route is along the shore, where the ice is frozen to the beach, forming what is known as foot ice. When the tide is out, there is a drop of ten feet down to the lower level from this shelf, which is from a few feet to about thirty feet wide. The shelf forms our roadway to the north.

The ice is continually moving and grinding, making fantastic noises. When camping near by for the first time and the evening meal is over and you roll into your sleeping bag, it is not long before you hear these noises and think that maybe the ice is breaking up or some polar bear is near by looking for a meal. After two or three nights on the ice, you learn to forget everything and sleep very soundly.

Lieut. Comdr. Schlossbach has been constructing a new airplane sled made of dow metal, hickory and rawhide lashings. The sled has been tested for 500 pounds and weighs less than 10 pounds. It is made so that it can be taken apart and stored in the plane. He has plotted and figured the trips that he is to make next Spring, prepared the supplies and mapped out precautions for emergencies.

Roy Fitzsimmons and Robert Danskin spend many hours daily making and checking magnetic observations. Many of these observations are made outside and require from four to five hours to complete.

Weather observations are made every hour for the full twenty-four. These observations consist of the sky condition; the amount of clouds, how high the clouds are, the visibility, temperature, wind direction and barometric pressure and any other special phenomena. This information will be of value in the future in case an airway is established over the polar route. Continuous star observations are made when the sky permits. Pilot balloons are sent aloft daily. Photographs are made of the aurora.

MacGregor Party Reports Aid to British Expedition

By CLIFFORD J. MacGREGOR,

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REINDEER POINT, Greenland, March 21.—Spring may have arrived in the States today, but from the looks of the thermometer here one would think that Winter had just arrived. The temperature is 21 below zero, with a strong north wind blowing, filling the air with snow.

The British Arctic Expedition arrived last week from Thule, Greenland, where they had been wintering. They had to make the trip over the Greenland ice cap. They had planned on wintering in Ellesmere Land, Canada, but were unable to cross over last Summer because the coast was icebound. They departed for the North by packing their supplies over the 2,500-foot mountains to the north of our camp.

Several members of our expedition assisted them in making the climb, as it was necessary to pack each box of supplies on their backs and make several trips in order to take enough supplies to last them about two months. They intend to map the coast farther north in the event that they are unable to reach Ellesmere Land. They were accompanied by Smith Sound Eskimo drivers and dog teams who are acquainted with the ice and Northern conditions.

If they are successful in making the crossing of Kane Basin, they will lay out a landing field for us in Ellesmere Land. They plan on returning about June 1 if ice conditions permit. In case they should get stranded in Ellesmere Land, we will try to effect a rescue some time in July. Conditions have been extremely bad for traveling here this Winter due to strong winds of gale force breaking up the ice.

GREENLAND WINTER UNUSUALLY WARM

December Average Is 7.7 Degrees Below Zero When 30 Below Was to Be Expected

By CLIFFORD J. M'GREGOR

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REINDEER POINT, Greenland, Jan. 8 (By Wireless).—Unusual weather conditions continue throughout the Arctic region and many places in the world. Just what causes these erratic conditions is hard to say, but it is undoubtedly due to the sun spots. This is the maximum sun-spot year.

Last month, when we should have been having very cold weather, it was extremely warm for this part of the world. The lowest temperature recorded was 22 degrees below zero Dec. 20. The warmest day was the 5th, with a maximum of 10 above zero. Dec. 28 we had a temperature of 2 above, while in Labrador it was 40 below zero. The average temperature for December was 7.7 degrees below zero, although it should have been around 30 below.

Smith Sound has not frozen over. The water, being warmer than the surrounding territory, draws much air down from the Greenland ice cap, causing considerable surface wind. The average hourly wind velocity for the month was a little over ten miles an hour.

Precipitation occurred on eighteen days of the month. This all fell in the form of snow and, when melted, gave twenty-nine hundredths of an inch of water.

One problem that has been puzzling scientists for many years is the source of the moisture to maintain the Greenland ice cap. It is estimated that two inches of moisture is sufficient to maintain the ice that feeds the many hundreds of glaciers that flow into the sea. If this is the case, then it would appear that the ice is building up rather than diminishing.

From our observations it would appear that next Summer will have more icebergs than in the past few years. In the warm weather the ice does not freeze so hard. This will cause more of it to break off and feed south into the transatlantic shipping lanes.

There are certain areas in the polar region known as "centers of actions." These high pressure areas are built up by the uneven heating of the surface of the earth by the sun. The warm air rising at the Equator flows toward the polar regions. There it is cooled and begins to sink toward the surface of the earth.

Weather observations made in the polar region show that there is a cold layer of air near the surface of the earth, then a warmer layer of air from three to six thousand feet thick. Above this is the cold air that has traveled from the equatorial region. This air has been chilled along the way at a very high altitude. It is drawn off into the lower latitudes, subsides and gives cold waves in the States.

Observations in the polar region with airplanes or radio sounding balloons could test several cross-sections of the atmosphere and make it possible to forecast weather many days and probably weeks in advance.

MAJ. F. G. JACKSON, BRITISH EXPLORER

His Expedition in 90's Proved Franz Josef Land Was an Archipelago—Dies at 78

LONDON, March 13.—Major Frederick George Jackson, one of Great Britain's most famous Arctic explorers, died here today at the age of 78.

Major Jackson's first expedition, that in 1894-97, wherein he proved that Franz Joseph Land is an archipelago and not a continent, also was his most successful, but he made many other expeditions in the course of his very active life. He undertook the first expedition to "run a polar show on his own" after Nansen had refused to take him on the voyage of the Fram. A few months later, having encountered Nansen's party, Mr. Jackson aided them, and later declared roundly that they would never have gotten home otherwise.

Won Honors in Boer War

Major Jackson won distinction in the Boer War and his World War decorations included the Mons Star. Invalided home from France, he later commanded the Southwark recruiting district for more than two years and in 1919 had charge of several camps of Russian prisoners in Germany.

His ceaseless journeys took him through vast regions of African wilds, including the Congo Forest. He descended the entire Congo River to the sea, and visited the sources of the three great African rivers, the Zambesi, Nile and Congo. In Liberia he was one of a commission appointed by the League of Nations to inquire into slavery charges.

Among his writings are "The Great Frozen Lands," "A Thousand Days in the Arctic" and "The Lure of Unknown Lands."

In 1929 the major married Mrs. Marguerite Wigan Fisher, elder daughter of the late Albert Hernu.

Admiral Byrd at Rites for Aid

BOSTON, March 23. — Funeral services for John Murphy, a member of Rear Admiral Richard E. Byrd's expeditions to the Antarctic, were held today in the Roman Catholic Church of the Most Holy Redeemer, East Boston. Mr. Murphy, who was caretaker of the Byrd ship, the Bear of Oakland, was drowned Saturday near the Army base in South Boston, where the ship is moored. Rear Admiral and Mrs. Byrd attended the services.

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The American Polar Society was founded Nov. 29, 1934, to band together all persons interested in polar exploration. Membership dues are one dollar a year, which entitles members to receive THE POLAR TIMES twice a year.

MRS. CAROLINE OATES, POLAR HERO'S PARENT

Her Death Recalls Sacrifice by Son of His Life in Vain Hope of Saving Comrades

LONDON, Nov. 30 (AP).—The mother of Captain Lawrence Oates, who gained a niche in British history as "a very gallant gentleman," died yesterday—twenty-five years after her son voluntarily walked out of a tent to die in a South Polar blizzard.

She was Mrs. Caroline Oates of Gestingthorpe, Essex.

Oates made his sacrifice on Captain R. F. Scott's 1912 expedition. When four men were marooned near the Pole, Oates, who was ill, stumbled from the tent and disappeared because his death would conserve the strength and food of the others.

The three comrades, one of whom was Captain Scott himself, perished in the tent within a few days. One of the last things Scott wrote in his diary was the tribute to Oates as "a very gallant gentleman." The tragedy occurred when they were nearing the expedition's base after finding at the Pole evidence that Amundsen had preceded them.

WILLIAM MURRAY, CHEF AND HERO IN BOER WAR

Also a Member of the Scottish Antarctic Expedition—Dies in New Haven at 65

NEW HAVEN, Conn., Nov. 22.—William Murray, member of the Scottish National Antarctic Expedition as chef, winner of medals for distinguished service in three years of Boer war campaigning in South Africa and ammunition expert at the Winchester factory here during the World War, died yesterday at the home of his sister, Mrs. Bella Allender, Rocky Top, Mount Carmel. His age was 65.

He was born in Aberdeenshire, Scotland, and as a boy had his first cruise on the whaler Windward as an apprentice cook. He next shipped on a sailing vessel from Liverpool to San Francisco and then joined a Hudson Bay Company fur expedition. His painted portrait hangs in the Edinburgh Museum for his colorful and patriotic service to England.

Mr. Murray was foreman at the Winchester plant of a section of society women who volunteered their services to produce munitions for the Allies. For several years he has been cook at the Hotel Garde and proprietor of the Hotel Charlton.

CAPT. H. W. SETON-KARR

200 Museums Had Trophies of Explorer and Artist

LONDON, Jan. 13.—Captain Heywood Walter Seton-Karr, explorer and artist, died in Paddington today at the age of 78.

In pursuit of big game he went on nineteen expeditions to Tropical Africa, twenty to India and twenty to the Arctic.

Many of his water colors hang in the Imperial War Museum here.

Cancer Afflicts Eskimo; First Case Found in Race

By The Canadian Press.

OTTAWA, Dec. 13.—The hope of the medical world that there was one race immune from cancer, the Eskimo, has vanished with the report reaching the Department of Mines and Resources that a native from Lake Harbour on Baffin Island has been found to be afflicted with the disease.

So far as is known by Dr. L. D. Livingstone, medical officer of the Eastern Arctic patrol and one of the best informed doctors on health of Eskimos, having spent several Winters in the Arctic, this is the first occasion a native has been known definitely to have cancer.

Each year doctors on the Eastern Arctic expedition examine hundreds of natives. This year they examined 700. Never before have these examinations revealed cancer.

This year three Eskimos were examined at Lake Harbour and transferred to a hospital at Pangnirtung, on the east coast of Baffin Island. A growth from one of the natives was taken to Montreal.

The Pathological Institute of the Royal Victoria Hospital has reported that the native had cancer.

Scientists Want Station Near Magnetic Pole

Ottawa Government Considers Request for Financial Aid

OTTAWA. Jan. 3 (UP).—The Dominion government is considering a proposal to build and maintain a scientific station near the Arctic Archipelago. Aid of the government is sought by Canadian, British and United States scientists to delve into the secrets and resources of the North country.

The northern end of the Boothia Peninsula is the proposed site of the station as it would be adjacent to the north magnetic pole. Observations would be radioed to the outside world daily in winter and summer, according to plans. Magnetic compasses pointing to the north magnetic pole vary slightly from year to year and a station in the vicinity would verify this deviation.

Before a site could be established, flying conditions would have to be for aerial navigation has been one of the chief handicaps in exploring the Arctic islands.

Tells of Canada's Northwest

"Canada's Western Northland," a companion publication to "Canada's Eastern Arctic," published in 1934, has just been issued by the Lands, Parks and Forest Branch of the Department of Mines and Resources. A most informative and interesting booklet, it deals with the history, resources, population and administration of the mainland portion of the Northwest Territories and the more southwesterly islands of the Arctic Archipelago. These two reports bring up to date and correlate available information relating to Canada's Northland.

SEES ARCTIC ISLAND AS VACATION RESORT

Edward Shackleton Declares Planes Bring Toronto Close to Ellesmere

TORONTO (Canadian Press)—Edward Shackleton, 26-year-old explorer, predicts that if aviation continues developing Canadians will be making vacation jaunts to the Arctic. He is the youngest son of the late Sir Ernest Shackleton, Antarctic explorer, and despite his youth has journeyed into the jungles of Borneo and many corners of the Arctic.

Mr. Shackleton declared Ellesmere Island in the Arctic, which he visited with the Oxford University expedition in 1934 and 1935, has the "healthiest climate in the world."

"The temperature there does not drop lower than it does farther south," he said. "I think it might be an excellent place for sanatoria in the future. There is a little lake there, 500 miles north of the Arctic Circle, that should be suitable.

"I have bathed in similar lakes in Greenland. I think a Summer resort might be established. Remember, if aviation keeps on developing the islands of the Canadian Arctic will soon be only a few hours' flight from Toronto."

While on Ellesmere Island he got "more sunburned than he did on an expedition to Borneo." Members of the expedition often went swimming in water 300 miles within the Arctic Circle.

Dominion Assists Quebec's Eskimos; Are They Indians?

OTTAWA, Feb. 9 (CP) — While the Courts are endeavoring to decide whether Quebec Eskimos are Indians, as defined in Section 91 of the British North America Act, the Dominion is taking responsibility for their relief, it was disclosed by an Order in Council brought down in the House of Commons. All Indians are wards of the Dominion and Quebec claims their Eskimos are Indians under the act.

T. A. Crerar, Minister of Mines and Resources, presented an Order in Council passed last week authorizing payment of $11,710 to cover emergency relief given Eskimos in Northern Quebec.

Since March 31, 1933, Quebec has refused to bear cost of relief among Eskimos made necessary by scarcity of game and low fur prices, the order stated. The Dominion has taken this responsibility without prejudice to its right to recover from the Province.

Scientists Head Northward

TORONTO, Jan. 4 (CP).—Headed northward today enroute to the Belcher Islands, off the east coast of Hudson Bay, for an eight months scientific expedition, Dr. Arthur C. Twomey and J. Kenneth Doutt, two United States scientists, carried only a deck of cards and a book of poems for amusement. The two scientists, who will study plant and animal life in the north, passed through Toronto yesterday and made their purchases here.

4 Russians on Drifting Ice Floe Describe Epic of the Polar Seas

By IVAN PAPANIN

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NORTH POLE WEATHER STATION (84 Degrees 13 Minutes North Latitude, 2 Degrees 40 Minutes East Longitude), Nov. 13.—We have just celebrated the completion of five months' happy residence on a drifting ice floe in the Arctic wastes. Thirteen of us and a dog dropped out of the polar skies on May 21 and landed on the roof of the world. Two days later, we were joined by thirty-one comrades who came on three airplanes and, under the captaincy of Otto Schmidt, we set about constructing the first meteorological station at the North Pole.

On June 6, most of the members of our expedition flew back to the Soviet mainland. Four of us, the permanent staff of the "North Pole" weather station, remained camped on the ice. My fellow-inhabitants of the drifting floe are Eugene Fedorov, astronomer, Peter Shirshov, marine biologist and Ernst Krenkel, wireless operator. Our faithful, four-legged friend, Vesely, or Jolly, an Eskimo dog, remained with us.

Although none of us had ever been at the North Pole before, we were not exactly unaccustomed to polar conditions. We had spent two years in an improvised, miniature polar camp near Moscow, where we had been testing all our clothes, tent, food, etc. When we began our drifting existence, we had nine tons of food stuffs, estimated to last one year. Jolly's sixty pounds of ration was included. We were supplied with specially designed clothes, a warm and comfortable tent and excellent scientific apparatus.

"Home" Is Cozy and Warm

Perhaps our "home" looks a bit unsatisfactory from the outside, but it is cozy and warm inside. Its duraluminum frame is covered with two compact layers of tarpaulin and a third one lined with fur. The plywood floor is covered with deer-skins on which we can sit Turkish fashion only, since we have no chairs. In addition to our two double-decked cots, our tent accommodates a powerful wireless station and a hydrochemical laboratory with a complete set of meteorological instruments.

In the course of our five-month sojourn on the ice we have drifted five degrees southward. Our astronomical observations enable us to determine the location of our camp and its route. Our calculations will help us establish the general law of Arctic icedrifts.

Special rotators enable us to maintain a daily check on the drift. Our observations are made by lowering two rotators simultaneously and at varying depths. With each series of observations, we study the nature of the currents at six or eight different depths. Shirshoff and Fedoroff do most of the scientific work, practically twenty-four hours a day. Krenkel and I are doing our best to assist them.

As a result of our experiments, we have hit upon a highly interesting phenomenon. The wind propels the ice by blowing on its surface. But due to the earth's rotation, the drift deviates from the wind's direction about forty degrees to the right. The movement of the ice sets the surface of the water into motion. The depth affected by the drifting ice depends on the speed and duration of the latter. It seems, therefore, that the law of the drift is determined by two factors—the velocity of the wind and the rotation of the earth. Independently of any winds, our ice-floe has been following a constant southerly course at the speed of one and one-half to two miles a day. We have already traveled more than 400 miles.

Nine Soundings Made

Our rotators have enabled us to understand the law of currents flowing in the upper regions of the ocean. Under the influence of the drift, the water near the surface is drawn along by the floe. At somewhat lower depths, opposite currents arise and make up for the surface motion.

We sound the depths approximately every thirty or forty miles. Thus far we have made nine soundings with our special winch. At the first sounding, we found a depth of 4,920 meters, which decreased to 3,500 and 3,700 meters as we traveled southward. From 250 meters to 600 meters, we found streams of warm water currents, doubtless of Atlantic origin. We found sufficient plankton or organic life to disprove Nansen's famous hypothesis that there is no life in the central regions of the Arctic Ocean. Analysis of this Plankton has convinced us of its southern, Atlantic sources.

Fedoroff measures the deviations, inclinations and horizontal force of terrestrial magnetism and keeps a chart of the average magnitude of these forces, free from the disturbing influence of magnetic storms. The magnetic deviation in the vicinity of the Pole was 40 degrees west of Greenwich meridian and the inclination 86.5 degrees.

As on land, we measure the force of gravity by means of a pendulum. We have found the gravitational pull here stronger than scientists have hitherto supposed, an anomaly which grows as we move southward.

We make meteorological observations four times a day or, more correctly, four times every twenty-four hours, since we are not in a position to know the difference between day and night. Our observations are broadcast regularly four times a day and can be heard as far as Moscow, thousands of miles away. At the beginning of our experiment we planned to wireless only one weather report a day, but our wireless station proved so excellent (Krenkel can operate it even under water) that we were able to broadcast four times.

The windmill which generates all the power for our wireless, as well as for Shirshoff's and Fedoroff's batteries, failed us only three times—when Chackaloff, Gromoff and Levanevsky flew across the Pole toward America and we thought it desirable to broadcast weather conditions every three hours. We were then compelled to use our hand-operated emergency gasoline engine. We suffered bitter disappointment, however, when our fliers passed over us and did not drop us fresh newspapers from Moscow.

Since Oct. 11 we have been enveloped in polar darkness. The sun left us, not to return before the end of February. The frosts have begun—a certain token that we are approaching Greenland. The temperature has fallen to 32 degrees below zero. This is a far cry from our warmest day in July, when we sweltered in the heat of 2 degrees above zero (centigrade). Since then the mercury has been steadily dropping.

The Summer, with all its handicaps, was relatively easy. The thawing ice formed pools and streams two meters deep. Our supplies and tent had to be shifted all the time to prevent complete submersion. Our instruments were often washed away and had to be fished out of the water. A powerful stream once rushed into a hole in the ice and threatened to tear away our hydrological winch, which was kept fastened only with all the planks, hooks and poles we had. And yet it was easier to work than now and we managed to do our daily jobs in twelve hours.

Now our instruments alone take practically all our twenty-four hours. We are always busy warming our instruments with hot water and cleaning the air-hole in our tent, which is covered with a solid layer of ice most of the time.

Cooking a Difficulty

Cooking is our main difficulty now. In the Summer we had to save our supplies from inundation, but now we have to dig them out of the deep snows, after every blizzard. Then we labored to get rid of water and now we have to drudge just as much to get it, for the snow must be melted before it can be used for cooking.

To allow Fedoroff and Shirshoff full devotion to their scientific observations, Krenkel and I have relieved them of all household care. The cook's duties have fallen upon me and, so far, there has been no complaint about my culinary abilities. Nor is there any unemployment here. At one time the lamp lighter's post was vacant. After some discussion of the necessary qualifications, the honor was bestowed upon the director of the station.

Before we began our expedition, we decided to do without the pemmican and chocolate of the classical fares of Polar explorers. The Moscow Food Institute prepared a special, varied and well-balanced diet for us. We carried concentrated soups, jellies and meat extracts in addition to an adequate supply of fresh meat, fish, flour and cereals. Unfortunately, most of the fresh meat became inedible for us, much to the delight of Jolly, who became the beneficiary.

The more delicate and fragile instruments are kept in ice houses which we built when Winter began. Snow proved to be excellent building material. It became indispensable to the fulfillment of our "housing project." If a little water is sprinkled on the snow, it grows very hard in the frost, and ice walls can resist any wind, so that they make our ice houses veritable fortresses. In these houses we stored our magnetic and gravitation instruments. To these we extended electric lighting from our home tent and even installed a telephone near the astronomical theodolite so that the angles could be reported to people in the tent where the chronometers must be kept for warmth.

After a day's work in the cold, we crawl into our tent, on all fours, one at a time and try to relax somewhat. We are a bit cramped for space, however, for our ten square meters have to accommodate four beds, the wireless station, the hydrochemical laboratory, batteries and housekeepers' odds and ends. There is, of course, no space for chairs or tables, so we have to eat sitting on the floor, although we manage to rig up some kind of table at meal hours.

Lamps are always burning in the tent, both for heat and for light. We used to think that the lights were poor because of defective wicks or kerosene, but we soon learned that they were simply not getting sufficient air.

Deer-skin Shirts Worn

We cannot complain about our wardrobes. Our enormous felt boots enclosed in thick galoshes may seem funny on the mainland but are mighty comfortable here. Fur stockings help to keep our feet quite warm. We work in deer-skin shirts and seal-skin overalls. And, if we still have to endure a little cold during working hours, we slip into our wolf-skin sleeping bags after donning fur pajamas. Under such conditions sleeping is no problem. We doze off instantaneously.

Our "leisure" hours are quite entertaining, for Moscow regales us with the best talent. We miss nothing, from grand opera to the national boxing matches. We are particularly delighted with the wireless concerts the children of our various national republics arrange for us. And we are in frequent communication with our families. A few weeks ago Shirshoff's 4-year-old son personally informed his proud father of the birth of a little brother. We all warmly congratulated the happy father.

The rapid drift is carrying us into increasingly difficult regions, involving more study and care. We are endeavoring to do our duty so that our country's flag will be honorably borne from the North Pole to our camp's unknown destination, across the entire expanse of the Arctic Ocean. We shall justify our dear friend Stalin's confidence by exerting our efforts to the utmost.

Jolly at Oslo after being rescued from the ice floe

Ice Splits Under Soviet Party

MOSCOW, Feb. 1.—A terrific Arctic hurricane has smashed the ice floe on which four Soviet scientists have been voluntarily marooned for the last eight months. The floe has been split with a rift 500 yards wide and 5,000 long, leaving a fragment only 200 yards by 300 where the encampment is situated.

Two minor depots, one for tools, have been cut off but the men are unhurt, and their most valuable stores have been saved, although there is a crack under the hut in which they are living. They propose to build a snow hut. They beg Moscow not to be alarmed if radio communication should be broken.

A later message from them gave their location as Lat. 74:16 N., Long. 16:24 W. [This position is east of Greenland in the vicinity of Jan Mayen Island.]

MOSCOW, Feb. 2.—The four Soviet scientists on a polar ice floe reported by wireless today:

"Our ice floe has now broken down to 150 by 210 feet. We are living in a sink tent, but have saved all our instruments and records and we have food for three months. The floe goes on cracking. There is no room for a radio antennae, so we have erected a second mast on a near-by floe."

Thus laconically is recorded the second disaster in forty-eight hours on the ice floe. From three square miles to a half a square mile and now to the size of three tennis courts—it is like Balzac's famous story of the magic wild-ass skin that shrank with each wish granted to its possessor, but with it shrank his own life, until both skin and life had shrunk to nothing.

MOSCOW, Feb. 3.—All of the Soviet Union heaved a high of relief today when at 6 P. M. the radio announced that Ivan Papanin and his three companion scientists had reported all well on their small ice floe in the Arctic Ocean, that the wind had abated, the temperature was 4 degrees above zero Fahrenheit and the icefield was freezing in around them to the horizon.

MOSCOW. Feb. 4.—

Mr. Papanin said in a radio message that the Arctic scientists "expect the sun" today—not perhaps to see it, because, the message continued, there was a snowstorm and, a rather ominous sign, the temperature had risen from around zero Fahrenheit to 16 degrees. But the scientists did hope to detect a faint lightening of the horizon and know that the sun's rim was above it after the months of polar night and the recent days of peril.

The message elucidated what happened during the worst of the hurricane. It stated that their former living tent, which stood on an air cushion, was now partly submerged at a little distance across the water from their present position.

Mr. Papanin added that their food was piled on sledges and all was well.

MOSCOW, Feb. 6 (AP).—Four Russian scientists reported they were in extreme peril tonight as they frantically strove to prevent the tiny floe bearing their North Pole weather observation camp from being crushed in an ice jam.

Commander Ivan Papanin, in charge of the group, radioed that the ice around them was piling up, breaking into small pieces and shifting rapidly.

The endangered campers reported they had hastily placed all their equipment on sleds for a race to a safer spot if their 100 by 160 foot block should be crushed.

Commander Papanin gave the party's position as 73 degrees 10 minutes north and 18 degrees west, showing their camp had been pushed southwestward about fifty miles in the jam of ice piling up against Greenland.

MOSCOW, Feb. 7 (AP).—Radio communications re-established with four Russian scientists marooned on a small polar ice floe tonight revealed that they were drifting southwest, nearing the east coast of Greenland.

The campers, whose radio messages had been unheard for thirty-six hours because of magnetic storms, were cheered by improving weather conditions after a storm had threatened their tiny floe.

The meteorological station at Tromsoe, Norway, received a radio from the Russians giving their position as Lat. 72 degrees, 6 minutes N.; Long. 19 degrees, 38 minutes W., and within sight of Greenland. They experienced a terrible storm yesterday in which their tents were torn and considerable damage done but the weather today improved and they had succeeded in repairing most of the damage.

COPENHAGEN, Denmark, Feb. 10.—Information received by the Danish Greenland board from the Russian ice floe expedition placed its position at 10:30 A. M. today at Lat. 71 degrees, 56 minutes North; Long. 20 degrees, 53 minutes West on a southwesterly course between Cape Wardlaw and Cape Topham.

Dr. Lauge Koch, Danish Arctic explorer, reports that the Russians are in high spirits. They were visited by three polar bears, which they shot, so that they will have fresh meat for the first time in many months.

TROMSOE, Norway, Feb. 10 (AP).—The ice floe prison of four Russian scientists drifted within sight of Greenland's uninhabited shores today in the teeth of an Arctic gale, which hampered rescue efforts by ship and dog sled.

MOSCOW, Feb. 11 (AP).—The four Russian scientists adrift on an ice floe off the Eastern coast of Greenland reported today that an Arctic storm had wrecked the silk tent which had sheltered them while waiting for rescue.

The tent was ripped and the radio mast, which also had served as tent pole, was blown down. Loaded sleds were overturned. The radio, however, was set up in a new position and the campers built a snow hut in which to wait for relief.

RESCUED FROM DRIFTING ICE FLOE IN ARCTIC

Ivan Papanin — Ernest Krenkel

Eugene Federoff — Pytor Shirshoff

RescueShip's Searchlight Seen by Four on Ice Floe

MOSCOW, Feb. 12.—That the Papanin expedition may be rescued tomorrow was indicated by tonight's 11:30 broadcast. At 6:45 the icebreaker Taimir radioed to Moscow that she was only forty miles from the ice floe polar station, with which she had exchanged messages at 12:30.

Ivan Papanin reported seeing the Taimir's searchlight at 6 A. M. He gave his position as 71:37 north latitude, 20:10 west longitude. The Taimir's position at 6:45 P. M. was 71:38 north latitude, 17:20 west longitude.

The weather is clear and the Greenland coast is within sight. There is a moderate northwest wind and a temperature of 26 degrees below zero centigrade. The Taimir is moving at reduced speed through a thick field of broken ice.

In last night's message Papanin said he had located a flat ice floe, 420 yards by 250 yards on which he thought planes could land. An earlier message from the Taimir said the planes were ready to fly tomorrow.

First Attempt to Rescue Four Scientists From Ice Floe Is Unsuccessful

MOSCOW, Feb. 15 (Æ).—The first rescue flight attempting to locate the camp of four Russian scientists adrift on an ice floe off Greenland failed late today because of poor visibility.

Gennady Vlasoff, piloting a plane from the Soviet rescue ship Taimyr, which earlier had reported herself only fourteen miles from the floe and within sight of the explorers signal fires, flew for two hours during the afternoon without finding the camp.

He finally landed on the ice beside the icebreaker Murman, which took him aboard for the night. The Murman earlier had reported that she was twelve miles from the camp.

Pilot Vlasoff, who started his flight about 3 P. M., reported that the visibility was poor and grew less favorable during the flight, so that he was unable to see the snow hut occupied by Commander Ivan Papanin and his three comrades.

Other flights were planned tomorrow from both ice-breakers, which were only about ten miles apart. The ships were unable to advance farther into the ice mass.

Alexei Ostaltsefk, chief of the rescuers aboard the Taimyr, told Nikolai Ushakoff, assistant chief of the Northern Sea route, in a radio conversation that the Taimyr's crew was so eager to walk across the ice to Mr. Papanin's camp that he could only dissuade them by showing them a radiogram from Moscow forbidding such a trip.

The ice-breaker Murman, which the scientists radioed was clearly visible, pushed huge floes apart with her prow in carving a seaplane base out of the Arctic waters. The Murman's captain advised that he was within twelve miles of the drifting floe.

The Soviet ship Taimyr, some fourteen miles from the floe, fought her way foot by foot through thick ice to a position where her land planes could be assembled and flown from an ice field.

The Taimyr reported that both the Murman's searchlight and the explorers' bonfire were visible.

The work of unloading her planes was carried on in the early morning moonlight which spread a sheen over the majestic panorama of ice hummocks stretching to the near-by Greenland coast. The rays of the sun, which has broken the long polar night, shining for a few hours each day, facilitated the operations of the Murman.

MOSCOW, Feb. 16.—Rescuers finally reached the four Russian polar campers today when two airplanes from Soviet ice breakers landed near their drifting ice floe off Greenland.

They made no immediate effort, however, to take the scientists from the floe which had been their home during more than eight months of drifting southward from the vicinity of the North Pole.

The planes, after trying unsuccessfully yesterday to sight the campers from the air, located them without difficulty today.

Ivan Cherevichny, piloting a plane from the ice breaker Murman, spanned the twelve miles of ice between the rescue ships and the scientists and landed first. Gennady Vlasoff, flying from the Taimyr, landed twenty minutes later, but stayed only ten minutes. Pilot Cherevichny remained there.

Commander Ivan Papanin of the polar camp sent word that he would advise the leaders of the rescue expedition later as to when and how his men should be taken off the floe.

The planes were sent out after thick ice kept the ice-breakers from reaching the campers.

ON BOARD THE SOVIET ICE-BREAKER TAIMYR, off the Greenland coast, Feb. 17.—A fortnight's effort against gale and ice in an attempt to reach Ivan Papanin and his three comrades was finally crowned with success yesterday when Pilot Genady Vlasov established the first personal contact with the scientists since they landed at the North Pole last May 29.

Mr. Vlasov became the hero of the hour. Without wireless apparatus and using a small training plane, he flew out over the vast region of Greenland's icepacks, sighted the Polar party's tent and landed at the camp.

Rescue Pilot Tells Story

Following is Mr. Vlasov's own story:

"I circled the icepacks a long time, returned to the airport, refueled again and flew toward the Greenland coast. I had not gone far when I noticed four black spots dotting the jagged ice.

"Descending somewhat, we noticed an ice hut, made visible by black clothes hanging over it. Four tiny appearing men, Ivan Papanin, Ernest Krenkel, Eugene Federov and Pytor Shirshov, stood by, desperately trying to signal the direction of their landing field by excitedly waving their hands. Turning the plane in the indicated direction, we sighted a wide airfield, the limits of which were marked by black flags.

"We followed the movement of a man who was running toward the field and who arrived just as we alighted. It was Papanin, leader of the expedition. Tears flowed as we embraced.

"'This is what I call happiness,' Papanin shouted. 'You're the first man we have seen in the last eight months.'

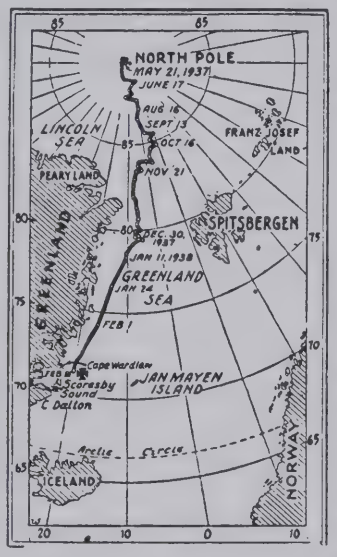
"Papanin ardently embraced Co-pilot Dorofeyev. He bombarded us with questions. We handed him gifts and letters. He asked us to convey his ardent greetings to all and his thanks for the solicitude of the government and the Communist party. Papanin, who never loses his head, managed even during those exciting moments to photograph our landing."

Finds Camp Well Arranged

Mr. Vlasov described the ice camp as closely resembling a peasant household where every inch of space is scientifically arranged. It was dotted with snow-built houses.

THE FINAL ACT IN RESCUE OF SOVIET ICE FLOE "VILLAGE"

Crews from the ice-breakers digging equipment from the bed of snow after the four Russian scientists, who had spent several months on the drifting cake in the Arctic, had been taken aboard the ships.



Four Taken Off Polar Floe After 9-Month Drift

Ice Breakers Cut Way In; Scientists Bearing Stalin Portrait Greet Rescuers

By The Associated Press

MOSCOW, Feb. 19.—Two sturdy ice-breaking vessels today smashed through a field of pack ice ten feet deep and removed four Russian scientists, with valuable records and equipment, from a drifting ice-floe camp off the eastern coast of Greenland. The transfer, effected just two days short of nine months after the four men were stationed on the ice a dozen miles from the North Pole, ended a unique odyssey in which they voyaged over more than 1,000 miles of Arctic seas on a raft of ice.

A terse radio message from the rescue expedition at 5:30 p. m. announced: "Papanin, Fedorov, Shirshov and Krenkel, with all equipment, removed from ice floe by Taimir and Murman, which are proceeding to Murmansk."

It meant that the ice breakers Taimir and Murman had battered their way through three miles of jammed ice and had picked up Ivan Papanin, forty-five years old, chief of the camp, and his three colleagues —Eugene Federov, twenty-eight, astronomer; Peter Shirshov, thirty-four, marine biologist, and Ernest Krenkel, thirty-four, radio operator.

The two vessels had reached the three-mile striking distance only after days of maneuvering against shifting fields of ice and tricky Arctic currents. The campers, frequently reporting their position by radio, had sent a message several hours be-

fore saying they could see the lights of the approaching ships and hear the whistles.

Along with the men and equipment the rescue party was bringing back meteorological and hydrographic records compiled by the scientists in their lonely, hazardous vigil through the long Arctic night—data to help the Soviet Union in plans to establish regular transpolar flights between Russia and the United States.

The campers had hoped to remain near the pole for an entire year of scientific research, but a shift of their icy camping ground during the polar summer launched them on their long voyage, powerless in the grip of Arctic currents. Their home had been a ten-by-six-foot portable shack, fur-lined against the bitter cold. Their food was mostly concentrated, the meat of 5,000 chickens, and milk. Sausages festooned the interior of their "home."

Day by day their radio station, with Krenkel at the controls, crackled out reports on their changing position and the progress of their highly circumscribed life. Down toward the eastern coast of Greenland they drifted. A polar gale broke up the large floe that had been their original camping ground, and they took refuge on a 100-by-160-foot fragment.

Another gale struck their new camp and ripped apart the silk tent that had been their emergency shelter. The radio antenna mast that had been a tentpole was toppled over. Hastily the men dug a new shelter into the ice and set up their radio again.

The Taimir led the way for the smaller Murman as a battering ram against the ice. The Taimir reported the rescue thus:

"At 1:30 p. m., the ice breakers approached the camp and stopped at a distance of one and one-half kilometers (about one mile). Eighty men from both ships started out with flags for the camp.

"The Papanin party, also carrying flags and a portrait of Stalin, met them. The command, 'Attention,' was given and the leader of the rescue expedition, Ostaltsev, reported to Papanin: 'At the order of the government, the ships Taimir and Murman have arrived and are at your disposal. I am awaiting orders.'"

Then there was a glad, informal meeting and rescuers and rescued cheered for Josef V. Stalin, secretary general of the Communist party. Then they broke camp. Quickly all the equipment and records were loaded on the Taimir.

The Taimir's account continued: "Here on the ice floe lots were drawn to see on what ice breaker the men would return. Papanin and Krenkel drew the Murman and Fedorov and Shirshov drew the Taimir. At 4 p. m., Krenkel clicked out his last radio report to Stalin and the government."

When the loading had been completed, the two rescue ships headed about and started the long voyage to Murmansk, on the Russian Arctic mainland.

Mr. Papanin and his assistants sent the following message from the polar station at 5:50 P. M. today to Professor Schmidt on the Yermak for transmission to Joseph Stalin, Vassily Molokoff, head of civil aviation in the Soviet; Klementy E. Voroshiloff, Commissar of Defense; Mikhail M. Kaganovitch, Commissar of Defense Industry; Mikhail Ivanovitch Kalinin, chairman of the Russian Socialist Federated Soviet Republic; Vlas Y. Chubar, Vice Premier; Anasthasius I. Mikoyan, Vice Premier; A. A. Andreieff, member of the Communist Political Bureau; Stanislav V. Kossior, Vice Premier; Andre A. Zhdanoff, alternate member of the Communist Political Bureau, and Nikolai Ivanovitch Yezhoff, Commissar of Internal Affairs:

"I am infinitely happy to report that the mission entrusted to us has been completed. From the North Pole we conducted fully all of the proposed investigations and collected valuable scientific material for the study of the drift of ice hydrology and meterology. We made a great number of gravitational and magnetical measurements and completed our biological investigations.

"Since Feb. 1, when our floe broke to fragments, we have continued all the investigations possible under those conditions. We were not anxious a moment about our fate because we knew that our mighty fatherland which sent forth its sons would never desert them.

"The warm care and attention for us of the party and government of dear Comrade Stalin, of the whole Soviet people, uninterruptedly maintained in us the conviction to accomplish successfully all of our work.

"Now we are leaving the ice floe after traversing 2,500 kilometers in 274 days. Our radio station, which first announced the conquest of the North Pole and maintained successful contact with the homeland, ends its work with this telegram. The red flag of our country continues to wave over the icy wastes."

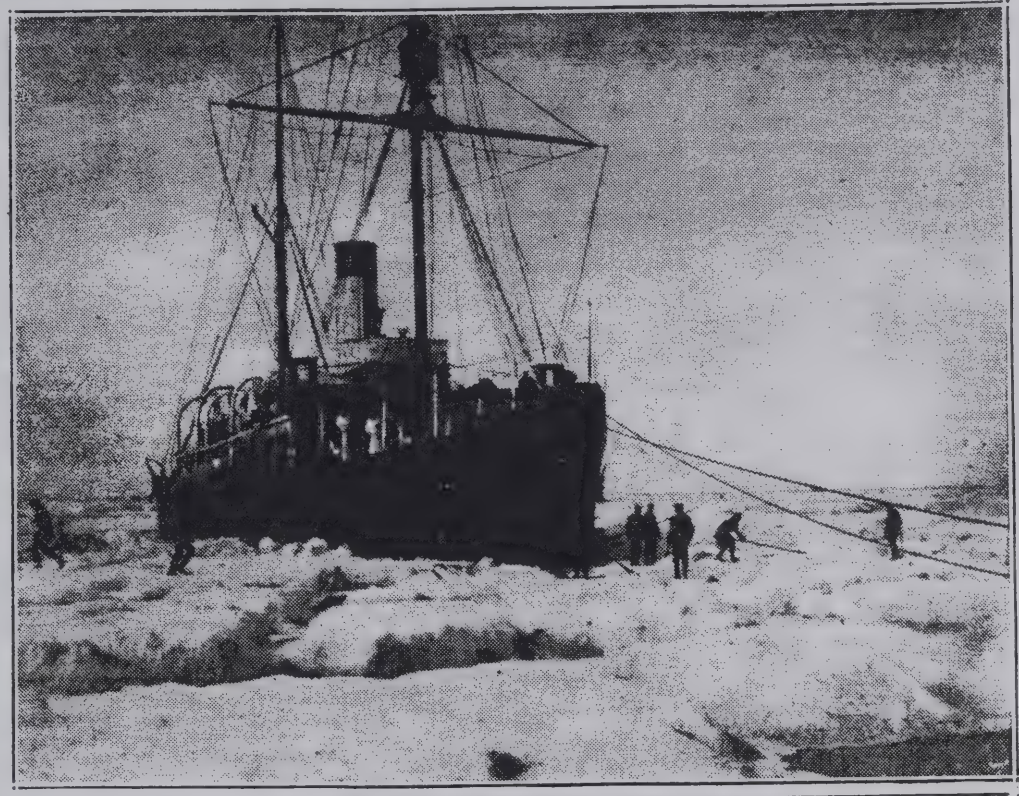
Station Now Is Closed

G. A. Ushakoff, chief of the Administration of the Great Northern Sea Route, today issued the following order-announcement:

"On May 21, 1937, at 10 P. M., there was opened a polar scientific station on a drifting ice floe at the North Pole with the following personnel—Commander Papanin, Radio Operator Krenkel, Hydrologist Shirshoff and Astronomist Federoff. After drifting 2,500 miles the station at the North Pole reached Latitude 70:54 North and Longitude 19.48 West and finished the program of scientific study.

"On Feb. 18 this year the personnel, data and belongings of the drifting station were taken aboard the icebreakers Taimyr and Murman. I salute the glorious group and congratulate them on fulfilling such a historical scientific mission. I order that from 4 P. M. on Feb. 19 this year the station on the North Pole be closed and removed from the list of polar stations of the Great Northern Sea Route."

One of the Ice Breakers That Rescued Soviet Scientists



The icebreaker Taimir on a previous rescue expedition in Bering Strait

Pay Last Visit to Camp

By EZRA VILENSKY,
Soviet Journalist

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ON BOARD THE SOVIET ICEBREAKER TAIMYR, OFF THE GREENLAND COAST, Feb. 20.—Saturday was the happiest day of our lives, when at dawn we sighted the camp of Ivan Papanin and his three companions. Four abreast, eighty of us marched toward the scientists, responding with Hurrahs! to their greetings of "Brothers." "Comrades."

We embraced the four scientists, hurled them into the air, kissed them and after a short meeting accepted an invitation to pay our first and last visit to the camp. The men were clad in the same clothes in which we left them almost nine months ago, black, shiny shirts and fur-lined trousers. In vain we searched for traces of ill health, betraying the difficulties they experienced during the past fortnight. Their faces radiated health, although Pytor Shirshoff and Eugene Federoff had just shaved and had badly cut themselves.

Two at a time, we crawled on all fours into the silk tent and got a glimpse of the scientists' home. Ernest Krenkel stood guard at the radio snow-house, his eyes bloodshot from lack of sleep, preoccupied and apparently unwilling to part with his beloved station. Only one person at a time could enter the place, which contained the radio apparatus, a diary, a loaded revolver, a tobacco pouch and some Balzac novels.

A knock on the door disturbed us and I went out to find Mr. Papanin waving a radiogram. Mr. Krenkel began sending it with an almost entirely frostbitten hand, using one finger at a time. When the finger would freeze, he would cover it up and use another.

Members of Polar party began to pack the loaded sledges, not forgetting the trophies of skins of bears they had killed. After leaving behind a Red flag and a portrait of Stalin, we boarded our ships.

The sailors shouted cheers and addressed the scientists as "comrade deputies of the Supreme Council." The scientists immediately began to improve their personal appearances in a special stateroom on which a shingle had been placed reading, "the Papaninites' barbershop." The ship's photographer-reporter cut Mr. Federoff's and Mr. Shirshoff's hair with a surgeon's knife.

Before sailing there was a banquet attended by the four scientists and by the crews of the Murman and Taimyr, at which Mr. Papanin was the chief entertainer, singing folk songs and performing Caucasian dances.

SOVIET SCIENTISTS CELEBRATE RESCUE

Ice-Floe Party Transferred to Yermak to Greet Professor Schmidt Officially

MOSCOW, Feb. 21.—The Soviet ice-breakers Taimyr and Murman sighted the Yermak at midnight last night and as the big ice-breaker approached the others she sent rockets blazing into the polar sky to greet the rescued scientists on the two ships and their rescuers. The Yermak is steaming at full speed through "nine ball"—which means an ocean nine-tenths covered with ice—through which the smaller vessels are advancing slowly.

The Yermak first picked up Ivan Papanin and Ernest Krenkel from the Murman and then the others from the Taimyr. They formally reported to Professor Otto G. Schmidt, official chief of the rescue parties, and then participated in the celebration of the meeting.

Incidentally it is worth noting that Izvestia today declares that while the parties from the Taimyr and the Murman were working like beavers to transfer the scientists' belongings to the ice-breakers, Papanin kept saying, "Quicker, boys, quicker," which looks as if the rescue were effected in the nick of time.

A correspondent of a Soviet journal tonight gives a lively picture of the first day abroad the Taimyr and transmits news of Papanin's dog, Jolly, which was neglected in the general rejoicing although Izvestia today mentioned that he was saved.

Jolly, it seems, has failed to live up to his name because he is "vastly embarrassed by the presence of a great quantity of people and retires under a bunk or takes refuge on the deck."

ICE ZONE IN RETREAT

Scientists Test Edge of Eternally Frozen Area in Siberia

MOSCOW (Science Service).—The zone of eternally frozen ground which blankets the top portion of Siberia and Russia is retreating to the north, researches reported by Tass, Soviet news agency, indicate.

An expedition organized by the Soviet Academy of Sciences measured ground temperatures at approximately the same point where they were measured by Academician Middendorf in 1842. At all these points, the ground was found to be warmer than it was nearly 100 years ago, in some cases the variation in temperature exceeding one degree.

Tests were made on the southern borders of the eternally frozen area in the lower and central reaches of the Yenissei River in Siberia. Ground temperature measurements were made by first sinking a number of wells and then making temperature readings.

The data, it is stated, upheld the theory that the zone of eternally frozen ground is retreating northward.

Russian Arctic Leader's Diary Cites Nervous Last Hours on Floe

Party Worried Over Fliers More Than Over Themselves—Too Excited to Eat as Ships Neared—Overwhelmed by Rescuers

By IVAN PAPANIN
Leader of Soviet Arctic Expedition

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ON BOARD SOVIET ICE-BREAKER YERMAK, off Greenland, Feb. 22.—Following are excerpts from my diary, written while our party of four were on the ice-floe:

Feb. 18.—Ships already are approaching and we are communicating with Ostaltseff [leader of the rescue expedition] aboard the Taimyr several times daily. Of course, Ernest Krenkel plays with his wireless all day, but he is very stingy with words because his batteries are exhausted.

Voices from the Taimyr and the Murman [rescue ships] come over the microphone sounding much like over the ordinary telephone. Lately Pytor Shirshoff and Eugene Federoff, although greatly fatigued, went in search of Cherevichny and Karabanoff [fliers in the rescue party who had been forced down] since we thought they had landed near us. We were much depressed with Cherevichny's disappearance.

Today we became convinced that the icebreakers could approach us and we decided to give up help from the fliers. Krenkel learned by wireless that the airplanes were being taken aboard the ships. Of course, in case of emergency we would rely on the airplanes, but thus far no emergency exists.

We informed the Taimyr and the Murman that our airdrome was unsafe and requested that they not fly again. This evening the icebreakers were approximately eight kilometers [about 5½ miles] from the pack ice. We carefully studied the road, searching the shortest way for carrying our baggage. Now I am content; our camp is located two kilometers from the edge, beyond which there is an unfrozen patch, which means that the ships can reach us.

Feb. 19.—I never will forget this day and night. We did not dine because we were so excited we simply couldn't swallow. Moreover, Ernest and I prepared a pretty bad meal. The borscht and cereal this time were so bad we hardly touched them. Cold pots full of the last food prepared at the ice camp remained on the floe. It is now 1 o'clock at night.

I went out of the tent and sighted the rays from the icebreakers' searchlights. Then the rays disappeared beyond the horizon. They were apparently searching for us, but couldn't locate us. I ran toward the edge of the floe, grabbed a can of benzine, tore off my fur shirt, poured the benzine and set it afire. I made a torchlight from rags, old furs and felt boots. They burned magnificently with a high flame. We warmed ourselves near the bonfire and were certain the ships had noticed us. However, we learned several hours later that our huge bonfire did not burn brighter than the ray and was hardly noticed.

Jolly, our dog, behaved very badly tonight. As soon as the silvery ray was visible he began to bark furiously. My nerves were so taut I could not quiet the animal.

At 6 A. M. Krenkel took up the vigil. Soon Federoff awoke. Stars were already visible and he began his astronomical observations. We sat down to write Comrade Stalin and the Politbureau [Communist Political Bureau] that our work was concluded. At 7 A. M. I fell asleep, slept until 10, and felt refreshed. At 12:30 I wanted to begin my meteorological observations, but the wireless demanded, "Fire torches." It was dawn. I was indignant—benzine had burned all night and now they demanded fire! What do they think this is, Baku? [Baku is the Soviet oil center.] But we lit the torches all the same.

At 2 o'clock the ships reached the ledge. Through field glasses we could see people hurriedly descending on the snow. I ran to meet the marching columns from the icebreakers. The Taimyrites and the Murmanites marched from two directions under the command of the polar explorer, Ostaltseff. I recognized many comrades with whom I had spent Winters in the polar regions.

They almost tore us to pieces. Only our fur trousers and shirts remained untorn. Our station ceases functioning. We gather near the wireless tent and enthusiastically sign a radio message to Stalin. Krenkel begins the radio. Again I feel a lump in my throat and try to run outside, but sailors, stokers, movie operators and correspondents assail me:

"Give me your tea cup?" "How about an autograph?" "Let me have a souvenir, your pressed compote, your soup-stove, tinned tomatoes?"

We demolish our large tent, which is almost entirely covered with snow. It is carefully taken apart and the sledges loaded. I take a farewell walk about our territory, approach the mast on which is Stalin's portrait and take off the portrait. I must confess I feel sad and sorry to leave this ice floe. It has been so comfortable, hospitable and cozy. We leave the Soviet flag on a snowhill. The flag will continue to drift until the ice thaws.

I am already aboard the Murman, according to lots which were drawn. I am sitting in a comfortable stateroom as I write these lines, and, leafing through my notebooks, it seems to me I haven't abandoned the ice floe yet and that I am dreaming a sweet joyful dream. But this isn't a dream—it's reality.

I am aboard a Soviet ship, among friends, countrymen, among my beloved Soviet people. It's no longer necessary to continue this diary.

Soviet Science to Continue Arctic Study; 'Robot' Observers to Radio Weather Data

It is an axiom in meteorology that our weather is made at the poles. True as this is in a general sense, it does not mean that weather at the poles is made in a different way than elsewhere on earth.

Further reports from the Papanites on their epic drift from the Pole make it plain that the laws of meteorology are the same at the top of the world as they are in Kansas. "Knowing the way the weather changes in the greater part of the Northern Hemisphere we can foresee what the weather is likely to be," comments Professor E. I. Tichemorov. "Storms in southern seas, snowstorms in temperate latitudes, Summer droughts, all are connected with the distribution of Arctic air."

The Papanites drifted in the polar seas in order to facilitate the prediction of the weather and hence navigation by way of the Great Northern Sea Route. Their observations make it possible more effectively to correlate Arctic conditions with those that prevail in lower latitudes. In other words, the weather forecaster who would aid a navigator of the polar waters must know the meteorological conditions in Canada, the United States, the Russian steppes as well as those of the frozen North.

Equally important to air navigators who would fly between Moscow and San Francisco over the Pole are the studies of terrestrial magnetism made by E. K. Fyodorov, one of the Papanites. The compass needle does not always point to the true magnetic north everywhere. Even Columbus noticed that on his first voyage to America. Now that Fyodorov has determined how the needle is affected by terrestrial magnetism over a wide area in the Far North, fliers who set out from Moscow or San Francisco to reach the other side of the earth by way of the Pole will know how to lay their courses. Curiously enough, the Soviet scientific commentators neglect to point out that gyroscopic compasses would do away entirely with the difficulties interposed by magnetism.

Professor N. N. Urvantzev, vice director of the Arctic Institute of Leningrad, announces that there will be more ice-floe scientific expeditions. With their aid a network of stations is to be established along the entire Arctic coast of Soviet Russia. Some of these will be fixed and automatic, meaning that unmanned wireless sets will transmit the "readings" of barometers, thermometers, wind-velocity measurers, moisture indicators to a central bureau; some will drift on floes. After years of record-making and record-compiling the Soviet scientists will be able to deduce the way in which ice forms and moves, to place weather prediction on a more exact basis and to make Arctic navigation safer.

It is evident from all this how much the opening of the Great Northern Sea Route means to Soviet Russia. The more that is discovered about the riches of the Arctic regions the more imperative becomes the need for scientific information. It is estimated that there are hundreds of millions of tons of coal in the Far North, as well as rich deposits of lead, silver, zinc, arsenic. Between the Yenesei and Lena Rivers in the Taimyr Peninsula there is oil; on the Kola Peninsula iron, rare earths, nickel and other metals have been found.

POLAR CAMP AIDED U. S. WEATHER DATA

Daily Reports Were Received in Washington From Ice Floe in the Arctic

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WASHINGTON, Feb. 12.—The dramatic story of four men on an ice floe drifting away from the North Pole toward dangerously warm waters below the Arctic Circle probably has aroused more interest in Washington than in any place in the world outside of Russia, the home of these ice-dwellers.

The activities of the Polar pioneers have been of great value to the United States Weather Bureau. Almost from the day Leader Ivan Papanin and his three associates pitched their camp at the top of the world, May 21, 1937, the bureau was, until Jan. 29, receiving four times daily their reports on Polar temperatures and other meteorological manifestations.

The Pole is said to be the "weather kitchen" of the world, and knowledge in Washington of what is being cooked up there enables our scientists to make a shrewd guess at what sort of weather will be coming our way later on.

The establishment of a meteorological and hydrographic station at the North Pole climaxed but did not end the Soviet's thrilling battle to fit this lost corner of the world into the economic scheme of modern civilization.

57 Stations in Operation

To knit together that broad land, fifty-seven radio weather stations are in operation across the top of Russia, from Franz Josef Land to the Bering Sea, and down to Kamchatka. The North Pole station was No. 52 in this series.

The history of this Far Northern undertaking which led to a North Pole weather bureau goes back to the sixteenth century, in the days when Czar Ivan the Terrible was ruling Muscovy, and England's desperate search for a new route to the Far East and the rich Indies.

The Portuguese and the Spanish were masters of the two easiest routes—around South Africa and around South America. So the English tried both the Northwest Passage, across the top of Canada, and the Northeast Passage, over Scandinavia, Russia and Siberia.

The English never penetrated the Northeast Passage, but they left such an impression on Northern Russia that even today there is a remote tribe dwelling by the White Sea which expresses greeting in these words: "How do do."

200 Ships in Arctic Lanes

Last Summer twenty ships made the trip from Murmansk, at the western edge of European Russia, to Vladivostok, the southernmost port in Siberia, 6,000 miles away, through the Arctic Ocean, "the ice cellar," Bering Straits, Bering Sea, the Sea of Okhotsk and the Japan Sea. More than 200 ships made regular journeys between Arctic ports.

The Soviet's first interest in the Northeast Passage, which grew so intensive that the government conquered the ice, was based on trade. With the Arctic closed, a ship bound from Leningrad to Vladivostok faced a journey of 12,700 miles through the Suez Canal or 12,600 miles through the Panama Canal, instead of the 6,000 miles from Murmansk to Vladivostok.

To open the passage, which the Russians know as the Great Northern Sea Route, required intensive scientific study of winds and tides and ice packs, and for such study the meteorological stations were set up.

From the station at the summit of the earth, Commander Papanin and his fellow scientists sent prompt reports until their floe drifted into danger. Four times a day radiograms from Moscow would arrive at the Weather Bureau with the designation "Poo," indicating it was from the Polar station.

From the message, Paul Marks, associate forecaster, would learn the latitude and longitude of the floe on which the Soviet camp was pitched, the atmospheric pressure in millibars, the temperature in centrigrade, the weather at the time the observation was made and the past weather, and the tendency for the preceding three hours.

The last message arrived at the bureau at noon Jan. 29. Even then the floe was far from the pole, for the radiogram gave the latitude as 76 degrees 18 hours and the longitude as, Russian style, 346 degrees 14 hours. This would indicate a spot off the northeast corner of Greenland.

Out of the determination to open the Great Northern Sea Route has come not only polar weather data. The vast area of Northern Siberia, long held useless, has been found to be of great value in mineral deposits, furs and lumber. Ports have been improved or established on the Yenesie, the Ob and the Lena, the three mighty rivers which drain Siberia into the Arctic, and the Amur, which spills eastward toward the Pacific.

Floe Party Says Its Work Will Aid Polar Air Route

Four Scientists Reach Norway With Magnetic Charts

KOPERVIK, Norway, March 3 (A. P.).—Russia's Polar scientists who spent nearly a year's lonely vigil on an ice floe in the arctic wastes, said today that their reward was a valuable collection of scientific data.

Minimizing their physical feat in staying on the ice floe until it had split to a mere fragment, Commander Ivan Papanin said:

"We magnetically mapped the Polar basin, which is of special importance for a special air route from Soviet Russia to America."

The heavy shouldered Papanin, surrounded by his grinning colleagues, told his story aboard the rescue ship Yermak which put in here en route home. The four looked healthy despite the strain of waiting for rescue while their ice haven drifted dangerously through the stormy Iceland sea.

"Rescued?" Papanin said. "That's not the word. We were fetched off the floe according to plan.

"The ice floe never would have melted underneath us, but we might have been sunk beneath jamming ice. We had provisions for five or six months more. The time went quickly. We had plenty of work to do."

Papanin said they mapped hundreds of miles of Polar area and constantly studied the aurora borealis, noting that the Northern Lights shone clearest near the Greenland coast, their strength diminishing toward the north pole.

PNEUMONIA ATTACK IGNORED IN ARCTIC

Doctor Reveals That Ice-Floe Scientist Had Illness but Was Unaware of It

By EZRA VILENSKY,
Soviet Journalist

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ON BOARD THE SOVIET ICE-BREAKER YERMAK, Off the Iceland Coast, Feb. 23.—Ernest Krenkel, wireless operator on the drifting Soviet weather station, suffered pneumonia during his polar sojourn and did not know it, it was revealed today after a special medical examination by Ship's Surgeon Chechulin.

"Was either of you ill at any time?" the physician asked Ivan Papanin, leader of the polar expedition, and Krenkel.

"Ill?" both, opening their eyes wide, replied. "We should say not!"

"I am sorry to inform you, Comrade Krenkel," Dr. Chechulin went on, "that you had a case of pneumonia, but, owing to special circumstances, you were not visibly affected."

There followed an animated discussion of the reasons for the fact that the scientists enjoyed phenomenal health and did not develop scurvy despite the severities of the climate, their diet and their mode of living.

According to Dr. Chechulin, who seems to agree with the American explorer, Vilhjalmur Stefansson, that vegetables are not indispensable for the maintenance of health in the Arctic provided the necessary vitamins are available, the concentrated foods that the scientists carried had sufficient vitamins to enable normal functioning of the body. The concentrated foods developed special resistance against disease, hence the conclusion—use vitamin concentrates.

However, Professor Otto Schmidt, chairman of the Great Northern Sea Route Administration, vigorously objected to this theory. According to Professor Schmidt it isn't a matter only of vitamin concentrates, but also the Arctic's remarkably clear air and the regular physical activity. These, he believes, are the main factors producing health in the Arctic.

It is really a pleasure to observe the appearance of the ice campers. They are all clad in uniforms of the Great Northern Sea Route. Their weather-beaten faces give the impression of sailors who have returned from a long voyage and who have experienced furious hurricanes.

Russians Teach Eskimos

PETROPAVLOVSK, U. S. S. R. (AP).—Forty-seven Eskimos from the Soviet Arctic, brought here on the Kamchatka Peninsula for instruction in political leadership, had to be taught first to tie their shoelaces and button their clothes. By dog-sled, reindeer-sleigh and boat, the young Eskimos traveled thousands of miles from remote regions, including the Chukchee Peninsula, just across the Bering Strait from Alaska. Here they were dressed for the first time in European clothes, saw their first map, were told why the moon shines and learned of the new Soviet Constitution.

MOSCOW WELCOMES 4 POLAR EXPLORERS

Papanin and Companions Ride in Triumph to Kremlin, Where Stalin Receives Them

MOSCOW, March 17 (AP).—Commander Ivan Papanin and his three companions were welcomed home from their Polar explorations today in a heroes' procession to the Kremlin, where Joseph Stalin received them.

They came on a special train from Leningrad, where they had been brought by the icebreaker Yermak, one of the Soviet vessels that rescued them from their crumbling ice-floe camp off the coast of Greenland on Feb. 19.

They paused for speeches on a platform in front of the station and then rode in open, flower-bedecked automobiles through lines of Red banners and huge portraits of Stalin and other leaders held aloft by half a million Muscovites. The turnout for the ice-floe heroes was so dense that Cossacks serving as mounted police could not push through the crowds.

Mr. Papanin said no other Polar explorers ever had support from their governments "such as we had."

3 Ships Fight to Rescue 216Aboard3Icebreakers

Are 250 Miles From Vessels Locked in Ice Jams

MOSCOW, March 28 (UP).—Three Soviet ships, attempting one of the most dangerous rescue expeditions in the history of polar exploration, fought their way tonight toward three other vessels which have been adrift for five months, locked in ice jams, their fuel depleted.

The icebreakers Sadko, Malygin and Sedov, with 216 persons including a number of women aboard, reported their position as about 600 miles from Tixa Bay, at the mouth of the Lena River. Approximately 250 miles away the icebreakers Lenin, Ilmen and Dixon pressed forward toward the drifting vessels. Also near-by were the Josef Stalin and Kamachdal. The Lenin, Ilmen and Dixon are to be used as a base for airplanes which will attempt the actual rescue. The planes will fly from Moscow to the base, to be set up by the rescue vessels, then attempt to remove the majority aboard he Sadko, Malygin and Sedov as soon as the breaking of the polar dawn permits.

FIVE LAYERS IN LAKE

Fresh, Brackish, Salt, Red and Sulphur Water on Arctic Isle

LENINGRAD (Science Service).—Five well-defined layers of water, each different from all the others, have been found in a lake on the Arctic island of Kildin, near the Murmansk coast.

From surface downward the layers of water are: fresh, brackish, strongly salt, red, and sulphurous. The sulphur gases dissolved in the bottom layer are deadly to almost all forms of life, but the bacteria that give the fourth layer its red color feed on the sulphur and prevent any of it from poisoning the layers above.

Papanin Describes Early Plans For Soviet Camp in the Arctic

By IVAN PAPANIN

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ON BOARD THE SOVIET ICE-BREAKER YERMAK, in the Baltic Sea, March 14.—While homeward bound, approaching the shores of my native land, I begin to recall how the idea of the expedition now nearing completion arose.

When Polar explorers, wintering in the Arctic or sailing across the Great Northern Sea Route, assemble in the evening after a hard day's labor, they discuss the future of the Arctic. One such animated discussion that occurred three years ago comes to my mind. The question was whether it was possible to land a group of wintering scientists on ice floes in the center Polar basins.

This bold dream of Fridtjof Nansen and Captain Otto Sverdrup seemed fantastic to many. It was alluring indeed to think of working in a boundless expanse of ice fields where man never had been. Then there was the question of how to transport equipment and provisions and how to remove the men and instruments. It all sounded unreal.

Stalin Interested in Arctic

But, in 1935, I learned that Joseph Stalin was interested in the problem. Our brave pilots then were making the first preparations for a transpolar flight to America. On the fliers' course was a vast unexplored region, stretching from Tranquillity Bay to America, without weather service or radio sattions.

I realized that the time had come for fulfilling Mr. Nansen's dream, and I offered my services to Professor Otto Schmidt, director of the Great Northern Sea Route, who appointed me head of the North Pole station, which I began organizing in February, 1936. Professor Schmidt said Stalin was personally interested in the expedition and, therefore, I exerted all efforts to accomplish the task.

The work has new and equipment had to be prepared. Since the airplanes could transport only nine tons, every ounce of weight that could be economized mattered. Three of us at innumerable times estimated the permissible weight of every instrument. We engaged scores of enthusiasts throughout the country who volunteered to help.

We spent considerable time experimenting with a duraluminum-framed tent. We had tried a rubber covering first, but found that it afforded bad ventilation. We threw out the rubber and replaced it with canvas, which proved satisfactory. On the ice floe the tent served without repairs until the end of the expedition. The waterproof canvas, chemically saturated, did not leak on the rainiest days.

Silk Used for Tent Covers

Experts of Moscow's rubber plant prepared excellent covers of rubberized silk, rubber containers for benzine and kerosene and inflated canoes and clipper boats. There was general rejoicing when specimens of this rubber, tested in the laboratory at a temperature of 60 below zero Centigrade, did not crack and remained flexible.

The radio apparatus and scientific instruments were prepared with equal care. The experience gained in previous Winters at the Polar stations on Franz Josef Land and at Cape Chelyuskin proved most valuable. Since the time I used a wind-driven engine at Cape Chelyuskin I became a great advocate of windmills. But American models of the lightest weight were too heavy for us. They weighed upward of 400 pounds. I insisted on a windmill not to exceed 106 pounds, for which I was called a lunatic. But such a windmill was constructed at a Leningrad laboratory.

Our clothes were outfitted by ordinary tailors, with underclothing of merino wool. All of the outfits were covered with reindeer hide. Sleeping bags and stockings of wolf's fur proved superior to reindeer fur, which sheds and injures the eyes.

We spent a year preparing. In the Spring of 1937 the station was ready. We pitched our tent on the outskirts of Moscow and lived in it for thirty days. Our equipment assured a wide range of scientific observations, but we seemed to be such a small group; four men could not perform the work which, under normal conditions on the mainland, requires a staff of nine. However, we thought we could manage, and proved it.

On June 6 the airplanes of Professor Schmidt's expedition, which had landed us at the North Pole, flew back to the mainland. We rested that first evening. Our minds retained fresh memories of the noisy days when the plane motors raised a hurricane in the clear, windless atmosphere, and thirty-eight people built our ice-block huts, pitched our dwelling tent and dug a hole in the ice for our hydrological work.

Measured Ocean Depth

We were compelled to begin hard work the following day. I will never forget the day we measured the ocean's depth for the first time, which had never been done before.

Pytor Shirshov, our hydro-biologist, operated the winch. The sounding lead sank a long time, and still there was no bottom. We reached a depth of 4,200 meters and were still going. Experts had advised it would take no more than 4,000 meters of cable, but we had not heeded their advice. The sounding showed a depth f 4,293 meters, which was the first secret of the Arctic that we learned.

Afterward, when in the course of the drift we had plotted more than a score of points just as deep and deeper, it became clear that a circular valley lay in the central part of the Polar Basin.

Along the entire stretch of Arctic we encountered warm currents of Atlantic origin at depths of 250 to 750 meters. These waters, found by Fridtjof Nansen in the more southern latitudes of the Arctic, exist not only on the fringe, but evidently throughout the Polar Basin's circular valley.

Our drift covered more than 2,500 kilometers, from 89 degrees 30 minutes to 75 degrees 30 minutes North Latitude. The ocean was sounded thirty-three times and thirty-eight hydrological stations were constructed. Where the water was the deepest, tests were made at twenty-four levels. Regular meteorological obsrvations were made until the last day of our drift. That was the most valuable part of our work.

Found Life in Polar Area

Daily the Arctic revealed its secrets. I recall how Ernest Krenkel's yell awakened me on Aug. 2: "Bear!—There goes a polar bear!" Hardly taking time to don felt boots, I flew out of the tent in my underclothes.

Several days later, in the middle of a fifty-meter patch of unfrozen water separating our floe from another, a huge sea lion swam out. The same day, at the 88th parallel, sea gulls and guillemots flew over us from the northeast. These events were not only of interest to us as hunters; they proved incorrect Nansen's view about the nonexistence of life near the North Pole.

Nansen thought that in the Arctic's center, where ice always covers the surface of the water and where the rays of the sun are supposedly unable to penetrate, microscopic alga seaweed and vegetable plankton could not exist. But Shirshov's net always brought up a brownish wash of such plankton; and bear, sea lion, sea gulls, crayfish and jellyfish demonstrated life in the Polar Basin is no different than in the rest of the Arctic.

Days Passed Rapidly

The days passed most rapidly. We worked without rest for days, but on our daily schedule we provided for recreation, chiefly listening to the radio. We followed some developments closely. Every one of us had an earphone hanging under his bunk. The remaining few hours of leisure were spent reading and in playing chess.

We shaved on the twenty-first of each month and shampooed our heads.

Our greatest holidays were when Velery Chkalov and Mikhail Gromov flew across the North Pole toward America. Then Krenkel did not leave his radio for three days, while I served coffee without interruption and prepared spare batteries. We followed Gromov's plane from the time it left Moscow until it reached America. We were very anxious to mark our ice floe so that Gromov would notice it. We mixed a special paint in a large can from the storehouse, and three of us hauled a sled while I, wielding a brush, painted the snow a deep red.

LENINGRAD, March 15.—Except for the Summer struggle with thaws and several ice jams in the wintertime, seven months of comparative comfort on our ice floe rather spoiled us.

By January our dwelling house was covered entirely with snow, only the top gable slightly protruding. First we tried to dig ourselves out, but we lacked the strength to do so. After every blizzard, therefore, we only dug steps in the snow and hibernated.

On Jan. 21 a furious gale blew up. Somewhere, far away, a crack resounded and reached our tent. The ice suffered severe pressure. We held our breaths and listened. We actually felt sick at heart.

I remember how, before our departure, when still on the mainland, the thought that we would soon remain alone in the white wasteland, face to face with Arctic nature, sometimes induced a certain melancholy feeling. These feelings came unexpectedly at various times to all of us.

Speaking frankly, there was perhaps also a certain sense of fear. But now, when the Arctic showed itself in all its ugliness, I watched my comrades and observed that none displayed the slightest nervousness. We had feared the Arctic only from a distance.

I walked with Ernest Krenkel around a circle of 650 feet. Everything was covered by a blinding snow. We were hardly able to return to the tent. All along the fissure blocks of ice were heaped up. It thundered, crashed and rumbled. Eight hours later it was unbelievably calm. After a close examination we found fine threads of cracks in the floe. It was difficult to foretell that these were the lines along which the ice-field that had served us so long would soon break apart.

I will remember forever the critical days of Feb. 1 to 8, when our enormous field dwindled to a small fragment. During days of hard labor, I had come to know my comrades well. Now I observed them in a most dangerous time, a test that would prove a conclusive one of their daring, fearlessness and self-reliance.

On Feb. 1, the first fissure appeared under our storehouse, the door facing the gap. One could easily have fallen into the bottomless stream. I smashed the roof with an ax. Eugene Federoff brought up a sled on which we loaded our provisions and hauled it to the windmill, where all our rescued property was stacked. The velocity of the wind rose to seventy feet per second. The blizzard blotted out everything, yet we worked merrily together.

Despair Shown By None

We had barely removed the stores when a crack appeared under our dwelling tent. No one despaired. We pitched silk tents near the windmill for our dwelling and our radio station. Provisions from our second storehouse, which was in process of being cut off by new fissures, were hurriedly removed to the center of the floe. We thought we would save sufficient supplies for three months, but we managed to get enough for six.

All around us ice floes were raging incessantly in motion. When the storm calmed down we tried to determine our bearings, but every half-hour the direction of the floe changed. Steel nerves were necessary to keep one's balance on such a whirling carousel.

The gale of Feb. 8 was another big trial. The wind was so powerful it overturned all our loaded sledges. Both the silk tents were blown down and torn to shreds. All our lanterns were extinguished.

Our electric flashlights penetrated only into a wild tempest of whirling snow. Rumbling, crackling noises resounded, and our dwindled ice camp split along new fissures. Ice blocks piled on top of the ground and one after another were demolished.

No Chance to Be Idle

According to an old custom of hunters, one should bury his head in the snow during such a blizzard, intrusting his soul to Allah, and wait quietly for the hurricane's cessation. But we hadn't a chance to seek shelter from the furious elements.

We began building igloos from snow blocks in a terrifying, blustering wind. Canvas that covered the sledges was blown away from our hands. We fastened them again. Snow drifts filled up the pits we would dig. We excavated them again.

By the time the wind had died down, we had become accustomed to our new diminutive home. We missed our large dwelling tent, which had become completely submerged. Our new floe was so tiny that we were compelled to establish our radio mast on a neighboring field.

Inside the snow-house the temperature never rose higher than outside but we felt content. We could have remained three months longer if the icebreakers Murman and Taimyr had not reached us on Feb. 19.

Russians Fifth Drifting Expedition to Test Nature

Theirs Appears Longest in Days and Miles of All the Parties Which Have 'Traveled' on Ice

Commander Ivan Papanin and his co-explorers, E. T. Krenkel, E. K. Federoff and P. P. Shirshoff, the Russian scientists who were rescued from a small ice floe off the east coast of Greenland, Feb. 19 completed the longest and perhaps the most hazardous ice-floe drifting expedition recorded in all the struggles to penetrate the Arctic. They passed more than 270 days on the ice and drifted approximately 1,300 miles. First direct contact was established with the expedition last week by rescue planes of the ice breaker Taimir, although Papanin and his party have maintained communication with Moscow by wireless during their nine-month stay on the floe.

As yet no definite information has been received of the mileage covered in driftings east and west and north and south, with the vagaries of the shifting ice, but it is conceivable that it will be found they traveled 1,500 to 1,600 miles.

The Papanin expedition is the only one that ever has come through the middle of the Polar route of the Greenland Sea, the most turbulant feeder of icebergs and great floes into the Atlantic Ocean, which has turned back numerous expeditions hundreds of miles south of where the Papanin scientists entered the drifts 700 miles south of the pole.

Five Arctic ice-floe drifting parties, including the Papanin group but not including those expeditions that have gone north primarily to make a dash for the pole, have been historic—three of them enforced when disaster overtook the ships, and two planned with scientific deliberation.

The closest approach to the Papanin record is that of Captain George E. Tyson, of the expedition of Charles Francis Hall, in the Polaris, from the United States in 1871. With eighteen persons, including two Eskimo women and their four children, he drifted 194 days and covered 1,300 to 1,400 miles.

193 Days on the Ice

Captain Karl Hegemann and his crew of fourteen of the Hansa of the second German North Polar Expedition in 1869 and 1870 drifted along the Greenland east coast, starting south from a point near where the Papanin drifters were found last week, and was on the ice for 193 days, covering 1,100 miles, before all made their way safely across to Greenland.

Dr. Fridtjof Nansen, Norwegian, with one man drifted 153 days and about 750 miles in the tumbling ice after his ship, the Fram, had drifted away from him and disappeared south to Spitzbergen. Dr. Nansen reached Franz Josef Land, then crossed in a perilous trip to Spitzbergen, where he and his companion were rescued.

The shipwrecked survivors of the Jeannette expedition, sent by James Gordon Bennett in 1879 and commanded by Captain George W. de Long, fought their way over ice and through water for ninety-one days and covered 700 miles before they reached land. Nine men perished in a hurricane close to the Siberian shore and twelve died of freezing and starvation battling their way over the barren wastes to reach civilization.

Captain Tyson and his castaways —after Captain Hall had carried the American flag to the highest point up to that time, had died and been buried on the north Greenland coast—drifted from October 15, 1871, to May 1, 1872. The night of April 15 was one of terror seldom if ever endured by any other group of ice drifters. Tyson's great floe, after hours of crunching against large bergs, suddenly broke up. A hurricane bore down and at 9 o'clock a heavy sea boomed across the floe, carrying away everything that was loose.

Rescue Eight Days Later

The women and children had been put into the whaleboat. All hands put their weight on the gunwale to prevent the craft from being washed overboard. Twice it was swept partly into the water but was dragged back. Each sea carried with it a swirling field of ice that battered the men until they were hardly able to hold on.

Morning brought the end of the storm and the capture of a bear. Eight days later smoke from a sealing ship off Labrador was sighted, and their worries were over. None were lost; and all, except for undernourishment, were in good health.

Captain Hegemann's drift was not so spectacular, but it ties in with the Papanin situation, as it showed a definite drift along the Greenland coast, once a particular spot opposite Cape Parry, around which the Papanin floe hovered, is passed.

Ships Separated

The Hansa and the Germania left Bremen in 1869 and were blocked by the Greenland Sea floe at about the 75th parallel. The ships were separated, and the Hansa was crushed by ice and sank. Captain Hegemann and his crew were carried on a comparatively safe course down along the Greenland shore ice. About 150 miles north of Cape Farewell at the southeastern tip of Greenland, they made land over the ice. The Germania was zigzagged in many directions before she could make her way through the ice and around the eastern coast of Iceland to home.

Dr. Nansen's journey was planned. Wreckage from the Jeannette had drifted apparently across the Polar Sea several hundred miles north of Franz Josef Land and Spitzbergen, and come out at the lower tip of Greenland. The Hansa drift, from the middle reaches of Greenland south, was definite. With the theory that these drifts had some connection, Dr. Nansen constructed the Fram, which was built saucerlike, so it would rise above the ice on pressure.

Dr. Nansen left Norway in June, 1893, and made swift passage along the Siberian coast to the point where he believed the Jeannette drift started, off the New Siberian Islands. September 22 the Fram became frozen solid in the pack, at a point not more than 300 miles from where the Jeannette sank.

For nearly a year and a half the Fram drifted steadily across the Polar Sea in the direction Nansen had figured. On March 14, 1895, after Dr. Nansen had determined that the ship would get no nearer to the pole, he and Lieutenant Frederick Johansen left the ship to make a dash for the pole, during which they reached the highest latitude attained up to that time.

When they reached the point where they were to rejoin the ship, the Fram was not to be seen. She had continued her drift, to come out in July, 1896, at Spitzbergen. Dr. Nansen and Johansen were carried eastward and southward. They had many escapes from drowning as the floes broke up, but finally made a perilous journey over the ice and through the water to Spitzbergen, where they were picked up.

The tragedy of the Jeannette expedition came after the ship had drifted almost 1,000 miles in the Polar pack, sometimes about 500 miles off the Siberian coast, and had made the greatest Polar penetration of any ship up to that time and exceeded since only by the Fram's. Captain De Long, with thirty-two scientists and seamen, left San Francisco July 8, 1879. On September 6 the Jeannette was frozen solid. For nearly two years the ship drifted, until June 12, 1881, then she was crushed and sank.

On June 19 the men started south with four sledges. Later the survivors were divided into three groups —Captain De Long and thirteen men in the first cutter; Lieutenant Charles W. Chipp and eight men in the second cutter, and Rear Admiral George W. Melville and nine men in the whaleboat.

Lieutenant Chipp and his men were swamped and lost. Melville and his men made land in Borkhaya Bay, on the other side of the Lena River promontory and about 125 miles from where on September 17 Captain De Long and his men reached the Lena near the mythical village of Sagastir. Instead of finding a habitation, they saw only two deserted deer hunters' huts.

Not a man was lost on the ice; and the real saga, ending with the death of De Long and his men, was written in the struggle of the starving freezing and ill-clothed men to make their way over the barren wilds down to some habitation several hundred miles away.

Jolly, the dog that drifted with four Soviet explorers on an ice floe occupies a cage in the Moscow Zoo.

SOVIET MAPS TRIP UNDERSEA TO POLE

Plans Submarine Voyage as Next Step in Establishing Air Line to United States

MOSCOW, Dec. 27 (AP).—Soviet authorities hinted that today a submarine expedition to the North Pole was being considered as the next step toward establishing a regular airplane service from Russia over the Pole to the United States.

The cruise of exploration under the Arctic ice was suggested recently in the official newspaper of the Commissariat of the Machine Building Industry in much the same manner as the Soviet flight to the Pole first was suggested early this year.

Publication of the article in the official journal was taken by some foreigners as an indication that a submarine already may be under construction for the adventure.

Without indicating Russia planned a similar expedition, Professor N. N. Zuboff, an authority on the Arctic, today said the Soviet Union would watch closely the new submarine expedition under the polar ice which Sir Hubert Wilkins, British explorer, was reported planning.

Sir Hubert has been searching the Arctic by plane for Sigismund Levaneffsky and five other missing Russian fliers. Soviet authorities said Sir Hubert's attempted voyage under the ice in the submarine Nautilus in 1931 failed because of inadequate preparation.

(In New York Vilhjalmur Stefansson said Sir Hubert hoped to make an Arctic submarine expedition, possibly late in 1938. It would not be a trip to the Pole, Mr. Stefansson said, but a search for a link between the Atlantic and Pacific Oceans under the arctic ice.)

The article in the organ of the machine building industry said the Soviet was scientifically and technically "equipped to solve the problem of under-ice polar exploration."

"The use of submarines in polar exploration," the article said, "together with planes and ice-breakers will speed the final conquest of the Arctic. The submarine opens new horizons for scientific research in the most distant and least known parts of the polar region.

"The submarine is fated to play a special part in putting into practical operation the airline from the Soviet to the United States via the Pole."

The analysis said submarines could carry men and equipment for the establishment of landing fields in the central polar basin, as well as go to the help of planes forced down along the route.

Unlike planes, submarines could travel regardless of weather.